

THE EFFECT
OF OBJECTIVE PRESENTATION
ON THE
LEARNING AND RETENTION
OF A
LATIN VOCABULARY

By

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AUSTIN G. SCHMIDT, S. J.

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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CHAPTER I.

THE PURPOSE OF THE STUDY.

The purpose of the study herein described was to determine the effect of objective presentation on the learning and retention of a Latin vocabulary. By objective presentation is here understood the use, during the learning-period, (*a*) of objects, (*b*) of actions, and (*c*) of pictures. All of these teaching devices may be used, as will shortly be pointed out, as helps in the formation of clear ideas, as means of rapid and economical repetition, as eliminants of the vernacular in direct-method teaching, and as creators of interest. There is a fifth possible function of objective presentation, dramatizations, and illustrations, and one more purely psychological than any of the four already mentioned; namely, the effect of this method of imprinting on the retention of the material to be learned. Do objects, action-games, and pictures increase and strengthen associative bonds? Do they diminish the number of repetitions necessary to secure a certain memorial response? Do they lessen the percentage of loss in tests for deferred recall? Are they, when foreign vocabularies are presented by the *indirect* method, more effective than a method of presentation in which the only appeal to visual and motor imagery is through the sight of the printed symbols and the pronouncing of them aloud? These are the questions that the present study attempts to answer.

At the suggestion of the American Classical League, Latin was chosen as the material about which the experiment was to be organized. The extent to which the results of this experiment are applicable to other languages can not be determined without further study. We may not assert *a priori* that what is true in

respect to Latin would be equally true in the case of another language, such as French, German, Italian, or Spanish. Whatever effect is produced by objective presentation depends, or at least may depend, in some way and to some extent on the nature of the symbols (words) as determined by the genius of the language. Until the degree to which the symbol itself—its sight or sound—enters into the production of the total effect is more fully understood, it would be safer not to extend our conclusions beyond the hundred words actually used in our experiment. However, if these hundred words are accepted as a fairly representative sampling of the nouns, adjectives, and verbs of the language, we may with a reasonable degree of certainty believe that such laws as are discovered by the data of this experiment will apply to all Latin nouns, adjectives, and verbs that lend themselves equally well to objective presentation.

CHAPTER II.

THE USES OF OBJECTIVE METHODS IN VOCABULARY-BUILDING.

(1) *Objective Methods as a Means of Securing Clear Ideas.*

The process of forming in the mind of the learner, by means of a verbal description, an idea of an object not present before him is slow, laborious, and uncertain in proportion to the complexity of the object being described and the learner's lack of familiarity with other objects of a similar type. Thus it would be difficult without the use of a model or sketch to give a child of the slums a clear idea of a plow. The problem would become almost insoluble if the child possessed no idea of certain of the essential features of a plow—wood, metal, handle, point.

The final test of the success of this teaching-process should be the learner's ability to recognize the object when he meets it. Students of botany and ornithology often go afield armed with descriptions of flowers and birds that enable them to identify strange species as they occur. But such descriptions may easily fail of their purpose; the more so when the object in question is so different from others as to afford no basis of comparison, or so similar as to make discrimination difficult.

The value of objective methods in this connection has been recognized for centuries. Comenius says in *The Great Didactic* (16:337):

He who has once seen a rhinoceros (even in a picture) or has been present at a certain occurrence can picture the animal to himself and retain the event in his memory with far greater ease than if it had been described to him six hundred times. . . . If the objects themselves can not be procured, representations of them may be used. Copies or models may be constructed for teaching purposes, and the same principle may be adopted by botanists, geometricians, zoologists, and geographers, who should illustrate their descriptions by engravings of the objects described.

In the conventional high-school Latin vocabulary there occur a number of words which at best can be but imperfectly understood without the use of models or pictures. Roman garments, Roman weapons, Roman houses and Roman camps, Roman tools and utensils—all these are fit subjects for illustrations. Place's *Beginning Latin* (68) has been praised because it "contains a picture to every page."

In the present study, as has been already remarked, no effort is made to measure the effect of objective methods in giving clear ideas of words that might otherwise be but hazily understood. The question at issue is not whether a child will have a fuller and richer notion of the meaning of *tree* if he is permitted to examine a tree. That such must invariably be the case is beyond all dispute. Our problem is to determine whether the sight of the tree assists in learning and retaining the couplet, *arbor, a tree*. The author encountered a surprising amount of difficulty in making this distinction clear to teachers who co-operated with him in the experiment. There was a constant tendency to hark back to the principles that govern the first presentation of a new word to pupils in the primary grades, and a certain persistent inability to perceive the radical difference between learning the meaning of a new word and memorizing the foreign symbol for an old one.

The author, therefore, can not repeat too often that nothing he may say should be interpreted as a challenge to the use of objective methods when first presenting new words and concepts to young children. In this field objectivity has a legitimate function and a value beyond dispute.

(2) *Objective Methods as a Means of Rapid and Economical Repetition.*

Publishers of direct-method systems, such as the Berlitz and the Gregg, furnish large charts containing on each page a number of objects falling under a single classification. One chart will show everything used in the kitchen; another will contain a farm-scene with domestic animals and agricultural implements; a third will gather together the various articles of apparel. The teacher, using a pointer, indicates one object after another and calls for

the foreign symbol. One purpose of this practice is to eliminate the vernacular symbol, a point that will be discussed in the next section. Another purpose is to secure more rapid and economical repetition. Except for teachers of the highest type, who have immediate and unhesitating control over the entire vocabulary to be reviewed, the use of such charts results in a more quick and certain form of repetition than would be possible if the teacher called for the words from memory. It is probably superior, from the standpoint of speed, to the use of flash-cards; and is less mechanical and uninspirational than the method of reading the words from a printed list. It is subject, however, to the obvious limitation of being applicable only to certain classes of words. Nouns signifying concrete objects are almost the only words that can be represented in this way. Parker (63:137) gives a diagram illustrating the quasi-objective presentation of prepositions; but while this device may make for interest, it is doubtful whether it has any direct influence on either clearness or speed. Chickering and Hoadley (13:46) use the figure of a man with folded arms and knit brows to represent *cogito*; but the picture is equally suggestive of either *irascor* or *doleo*: and it may be said in general of all verbs that it is most difficult to produce a picture that stands unmistakably for any one of them. The meaning intended by the artist or teacher must be explained to the learner, who thus has a double burden placed on his memory—that of remembering what the picture is intended to represent, and that of remembering the foreign equivalent for the action thus represented.

Charts and illustrations, then, may be used with certain limitations for securing additional rapidity in drill-work. By increasing the speed of drill we increase the number of repetitions within a given time. Ebbinghaus has pointed out (21:52 ff.) that retention is a function of the number of repetitions; or, to use a shorter and more technical term, of frequency. If we measure the efficiency of a memorial process by the time required for its production, disregarding such other factors as the expenditure of energy and resultant fatigue, it must be granted that a device which eliminates waste of time in securing repetitions will have a beneficial effect on memory-work. We say "which eliminates

waste of time;" for if the only desideratum were rapid repetition, the best device for such form of drill would be a tachistoscope by means of which the material could be presented with lightning-like rapidity. Pictures are not valuable because they shorten the time during which the mind of the learner is in contact with the material; but because they save the dead loss that comes from delay on the part of the teacher in presenting the stimulus-word, and prevent the total omission, through forgetfulness, of words that should be included in the drill.

(3) *Objective Methods in Direct-Method Teaching.*

Franke (25) early pointed out the psychological objection to using the vernacular in teaching languages. The word *vir*, he declares, should call up at once the image of a man; there is a needless waste of time if it calls up the image of the English word *man*, which in its turn calls up the object. The following diagram has been widely used to indicate the comparative efficiency of the two processes.

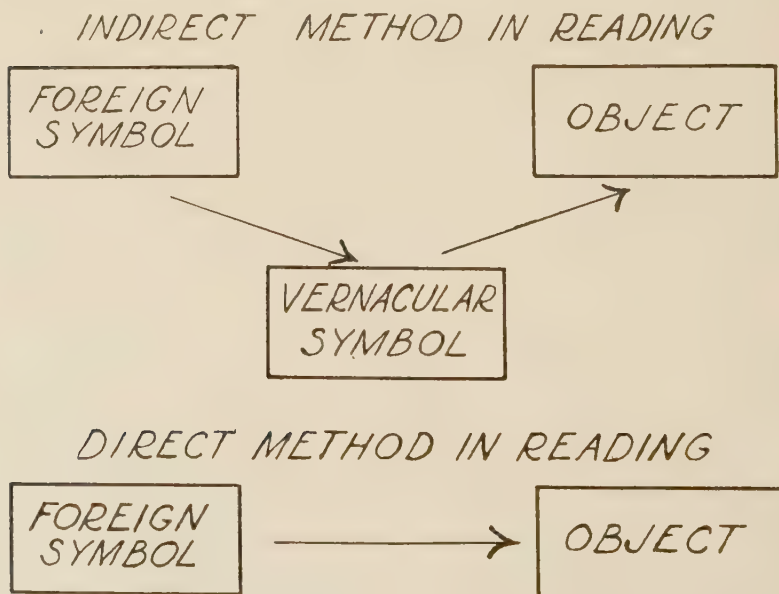


Fig. 1. The Direct and the Indirect Method Compared.

There is no occasion to enter here into a discussion of the merits of the direct method. The method apparently has more admirers than antagonists at the present time; yet Magni declares (50) that those who use it "fail to see the unreasonable and impractical in their procedure." Judd (35:221) quotes the Committee of Twelve on the question of phonetics in such a way as to suggest that his doubts would extend as well to other features of the system. Bagster-Collins declares (6:76) that it is impossible, with older children, to eliminate the vernacular. "With mature pupils their knowledge of the mother-tongue is far too strong and active to be eliminated so easily. The path of association between the word and the word it stands for is far too deep." Despite his long familiarity with German, G. Stanley Hall has somewhere testified to his inability to prevent the vernacular symbol from recurring when he was reading that language.

On the other hand, there appear to be persons who do succeed in stilling the ghost of the vernacular. The mere fact that many experience a difficulty in doing so would not constitute a valid objection to making the attempt. In the opinion of the writer, the question of the psychology of the matter is secondary to the practical one of the purposes underlying language instruction.

When Latin is taught by the direct method, liberal use is made of objects, pictures, and dramatizations. Such devices are in fact indispensable if we are determined to discard the vernacular equivalents of the Latin words. If the worth of the method is granted, there can be no dispute concerning the value of the means. We have here, then, an effect of objective presentation on vocabulary-building that invites careful investigation.

In the course of his experiments the writer met many persons who, judging too hastily from the fact that he was making use of objects and actions, thought that his purpose was to measure the efficiency of the direct method. But in the present study the intention was to discover whether the task of learning, for example, that *fustis* means *a stick* is facilitated by exposing a stick to the view of the learner. Now to use a foreign word such as *fustis* as the stimulus-word, and demand a vernacular word as its response is so far from being the direct method that it is its

very opposite and negation. The writer believes that his data will to some extent clear the road for a deeper study of the direct method, but he has certainly made no immediate approach to it in the present work.

(4) *Objective Methods as Creators of Interest.*

The increase of interest secured by the use of objective methods will, of course, affect vocabulary-building only indirectly. The data derived from the writer's experiment convince him that the quickest way for a child to learn a list of Latin *nouns* is to study them from the printed page. Theoretically, then, this would be the best way of learning a block of fifty or sixty words pertaining to Roman military life, such as *castra*, *tabernaculum*, *fossa*, *agger*, *cohors*, *scutum*, *gladium*, and other words of a similar kind. Yet under certain concrete conditions a sand-box representation of a Roman camp might beget so much interest, enthusiasm, zeal, and determination to learn as to cause a psychologically inferior method to produce far superior results. The value of all such *Lehrmittel* has been well described by Arnold (5) :

The modern language teacher should early start a private collection of *Realien* which may in the course of a well spent life, grow to the proportions of a small museum. Postcards, Rivière lithographs, *lettres de faire part*, wedding invitations, theatre programs, wooden shoes, business letters, photographs, rosaries, maps, books, of course, and even faience and candlesticks, for in such a heterogeneous mass are many of the eloquent bits of a nation which thru the teacher may become starting points of interest and culture. Just as Milton bedward bound ate a few olives and gained thereby visions of the Italy he had known in his youth, so a postcard of the Luxemburg gardens may make a French teacher glow with a contagious enthusiasm which his whole class may be made to share. The vital point in all teaching is the teacher, and the teacher who provides his pupils with suitable *Realien* and oozes *Realien* himself at every pore will never be accused of giving uncultural courses.

(5) *Objective Methods as a Strictly Psychological Aid in Memorizing.*

In addition to these four effects of objective presentation, we have that purely psychological function which is the subject

of the present study. This function consists in the improvement of the process of memorizing, which improvement is due solely to the sight of the object or the performance of the action. Thus one who would have a child remember that *avis* means *a bird*, may seek to secure better and quicker results by showing the learner a bird or a picture of one during the period of study. The factor we are seeking to isolate is the power of the object, action, or illustration to set up, independently of any added interest, a quicker and surer bond between the foreign symbol and the vernacular symbol.

We say "independently of any added interest"—a condition difficult indeed to verify. All normal children, boys and girls alike, will take more interest, for example, in a large lumber-yard going up in flames than in water dripping slowly from the eaves into a barrel. Likewise, in school work, some things will inevitably appeal more to the child than do others; and this "emotional congruity" has very properly been included by Arnold (4) among the secondary laws of association. Furthermore, in any delicately organized experiment tremendous changes can be brought about in the results by even a small amount of laziness, scepticism, apathy, disinclination to work, or lack of sympathetic response on the part of the learner. Such emotional states may be due to many causes, chief among which, perhaps, is the attitude of the teacher himself. In studies having to do with the comparative merits of two methods, it is difficult for the experimenter to maintain a strictly scientific attitude and do equal justice to both methods. Many other factors influence interest; such as the physical condition of the learner, the state of the weather, and the season of the year.

Instead of saying "independently of any added interest" we might have said, "assuming that no culpable neglect is manifest at any time," and such an expression would perhaps both express our thought more precisely and serve as a principle applicable to all experiments such as the present. Let us suppose that I intend to study the comparative merits of two methods by using them with various groups of children. I begin with Method I, and handle it as earnestly, intelligently, and enthusiastically as I can. The children respond favorably, so that any experienced

teacher would say of them that they were working hard. There is no culpable neglect of any kind. The time comes to apply Method II. The teacher must not permit any preference he entertains for that method to produce in him a greater amount of good-will and determination. There must not be any evidence of what we might call an ethical conversion on the part of the children, as a result of which they cease being indifferent and lazy. This is what we mean by saying that there should be no added interest. But Method II will differ from Method I in its natural attractiveness; and to postulate that despite this fact there should be neither an increase nor a decrease in interest is to demand an impossibility of teacher and pupils alike.

In brief, interest that is natural and innate—interest that arises spontaneously from the thing itself or the method of presenting it—is a variable factor that can not be controlled. That the existence of interest of all kinds—natural and derived, inherent and extraneous—deserves great consideration when data are to be interpreted is a truth never denied and too seldom applied in practice by experimenters.

In the experiment to be herein described, interest entered as an intruder despite all the precautions taken to exclude it. The result is that we shall find ourselves dealing, not with the rather impossible being who leaves his human nature at the door of the psychological laboratory, but with teachers and children as we meet them in the classroom. Such a condition was in fact inevitable when dealing with pupils in such large masses. It diminishes the value of our findings from the strictly psychological standpoint, but by way of compensation gives us a truer picture of the reactions of children actually in the schools.

CHAPTER III.

OBJECTIVE PRESENTATION AS A PSYCHOLOGICAL HELP IN MEMORIZATION.

(1) *Historical.*

There is no doubt in the mind of the writer that there exists among educationists and teachers a great faith in the power of objective presentation to assist learning in all the five ways described in the preceding section. Many, it is true, do not distinguish clearly between the five different functions of objective presentation as given above; but when the point is made plain and the question restricted to the fifth of the functions given, their expression of faith is just as unqualified as it was in the beginning. In contact with hundreds of teachers during the course of this experiment, the writer met but three who expressed any doubt as to the benefit to be derived from this use of objective presentation. It will, then, be of interest to endeavor to trace in some way the genesis of this idea.

Although no less an authority than Watson declares (86) that Comenius' *Janua Linguarum Reserata* was inspired by the work of the Irish Jesuit William Bathe, it is to the former and not the latter that we must turn for a detailed account of the principles underlying the use of objective methods in teaching Latin.

Comenius constantly insists upon the idea that the mental life of man begins with sense-perception (16:409):

Our faculties are best developed in the following manner. The objects should first be placed before the organs of the senses on which they act. Then the internal senses should acquire the habit of expressing themselves in their turn the images that result from the external sensation, both internally by means of the faculty of recollection, and externally with the hand and tongue. At this stage the mind can begin to operate and, by the process of exact thought, can compare and estimate all objects of knowledge. In this way an acquaintance with

nature and a sound judgment may be obtained. Last of all, the will (which is the guiding principle in man) makes its power felt in all directions. To attempt to cultivate the will before the intellect (or the intellect before the imagination) is a mere waste of time. But this is what those do who teach boys logic, poetry, rhetoric, and ethics before they are thoroughly acquainted with the objects that surround them. It would be equally sensible to teach boys two years old to dance, though they can scarcely walk. Let our maxim be to follow the lead of nature in all things, to observe how the faculties develop one after the other, and to base our method on this principle of succession.

He insists that objects should be presented to the senses as concretely and tangibly as possible (16:336):

In order that the mirror may duly receive the images of the objects, it is necessary that these latter be solid and visible, and be also placed suitably before the eyes. Clouds and similar objects that possess little consistency make but a slight impression on a mirror, while objects that are not present make none at all. Those things, therefore, that are placed before the intelligence of the young, must be real things and not the shadows of things. I repeat, they must be things; and by the term I mean determinate, real, and useful things that can make an impression on the senses and on the imagination. But they can only make this impression when brought sufficiently near.

From this a golden rule for teachers may be derived. Everything should, as far as is possible, be placed before the senses. Everything visible should be brought before the organ of sight, everything audible before that of hearing. Odours should be placed before the sense of smell, and things that are tastable and tangible before the sense of taste and of touch respectively. If an object can make an impression on several senses at once, it should be brought into contact with several, though with the limitations imposed in the seventh principle of e. viii.

He declares that things spiritual and absent can be presented in the same concrete fashion (16:339):

If any be uncertain if all things can be placed before the senses in this way, even things spiritual and things absent (things in heaven, or in hell, or beyond the sea), let him remember that all things have been harmoniously arranged by God in such a manner that the higher in the scale of existence can be represented by the lower, the absent by the present, and the

invisible by the visible. This can be seen in the Macromicrocosmos of Robert Flutt in which the origin of the winds, of rain, and of thunder is described in such a way that the reader can visualize it. Nor is there any doubt that even greater concreteness and ease of demonstration than is here displayed might be attained.

Although he defends objective teaching as a means of giving fullness, clearness, and accuracy to knowledge, he is explicit in stating that it is also an assistance to memory (16:337):

Since the senses are the most trusty servants of the memory, this method of sensuous perception, if universally applied, will lead to the permanent retention of knowledge that has once been acquired. For instance, if I have once tasted sugar, seen a camel, heard a nightingale sing, or been in Rome, and have on each occasion attentively impressed the fact on my memory, the incidents will remain fresh and permanent. We find, accordingly, that children can easily learn Scriptural and secular stories from pictures. Indeed, he who has once seen a rhinoceros (even in a picture) or who has been present at a certain occurrence can picture the animal to himself and retain the event in his memory with greater ease than if they had been described to him six hundred times. Hence the saying of Plautus: "An eye witness is worth more than ten ear witnesses." Horace also says: "What is entrusted to the fickle ears makes less impression on the mind than things which are actually presented to the eye and which the spectator stores up for himself."

In this same manner, whoever has once seen a dissection of a human body will understand and remember the relative position of its parts with far greater certainty than if he had read the most exhaustive treatises on anatomy, but had never actually seen a dissection performed. Hence the saying, "Seeing is believing."

If the objects themselves can not be procured, representations of them may be used. Copies or models may be constructed for teaching purposes, and the same principle may be adopted by botanists, geometricians, zoologists, and geographers, who should illustrate their descriptions by engravings of the objects described. The same thing should be done in books on physics and elsewhere. For example, the human body will be well explained if the following plan is adopted

In the quotations so far given Comenius is defending objectivity because of its fitness to discharge the first of the five functions

laid down above—that, namely, of assisting in the formation of clear ideas. The quotations, however, have for two reasons a bearing on the matter under discussion. In the first place, they are good examples of that almost unlimited devotion to objective methods which when found in an educationist creates in others the impression that he considers objectivity the panacea for all our ills. In the second place, Comenius explicitly asserts the existence of a close connection between concreteness in the first impression and memory. The reader will inquire whether Comenius extends this principle to cover the learning of a foreign vocabulary. It is true that a little reflection might have shown the great and good Moravian how radical a difference there is between acquiring the first thousand words of the vernacular and acquiring the first thousand words of some second language. If a child of two or three years has never seen a dog, it is manifestly advisable to show him one rather than to tell him that a dog is “a carnivorous animal of the family *Canidae*, kept in a domesticated state by man from prehistoric times.” But a child old enough to study Latin knows well enough what a dog is, and is for the most part doing no more than learn the foreign equivalents of words with whose corresponding objects he is thoroughly familiar. Is there any psychological reason for coupling a picture of a dog with the Latin word and its vernacular equivalent? Comenius thinks that there is. He says of the *Janua Linguarum* (16:356):

From this it follows, firstly, that words should not be learned apart from the objects to which they refer; since the objects do not exist separately and cannot be apprehended without words, but both exist and perform their functions together. It was this consideration that led me to publish the *Janua Linguarum*; in which words, arranged in sentences, explain the nature of objects, and, as it is said, with no small success.

Comenius extended this principle still farther in his *Orbis Pictus*. In an early German edition of this work we find the following lesson:

XXII.

Aves aquaticae.



Wassergeflügel.

☞ (47) ☞

Candidusolor, m. 3. 1.	Der weiße Schwan, I.	Candidus, a, um, weiß.
anser, m. 3. 2.	die Gans, 2.	
et anas f. 3. 3.	und die Ente 3.	
natant.	schwimmen.	
Mergus m. 2. 4.	Der Taucher 4.	
se mergit.	tauchet sich unter.	

Fig. 2. A Lesson from an Early Edition of the "Orbis Pictus."

The reader should note three facts. In the first place, Comenius is teaching by the *indirect* method. He wishes the learner to remember that *anas* is *duck*. Secondly, he uses an illustration of a duck to facilitate the process. Thirdly, he does this not because it makes the task of learning more interesting and pleasant, but because in his opinion it is the natural, normal, orderly, and psychological method to follow.

Comenius, unknown and ignored for almost two centuries, was finally discovered by the educational world and began at once to exert a potent influence on many thinkers, among whom was Pestalozzi. The latter re-affirms the Comenian principle that orderly sense-perception is the basis of all knowledge (65:159, 157):

The most important means of preventing confusion, inconsequence, and superficiality in human education, rests principally on care in making the first sense-impression of things most essential for us to know, as clear, correct, and comprehensive as possible, when they are first brought before our senses for contemplation.

Clear ideas to the child are only those to which his experience can bring no more clearness. This principle settles, first, the order of the powers and faculties to be developed, by which the clearness of all ideas can gradually be arrived at; secondly, the order of objects by which exercises in definitions can be begun and carried on with the children. Lastly the exact time at which definitions of any kind contain real truth for the child.

It is evident that clear ideas must be worked out or cultivated in the child by teaching, before we can take for granted that he is able to understand the result of such teaching—the clear idea, or rather its statement in words.

The way to clear ideas depends on making all objects clear to the reason in their proper order. This order again rests on the harmony of all the arts, by which a child is enabled to express himself clearly about the property of things, particularly about the measure, form, and number of any object. In this way, and in no other, can the child be led to a comprehensive knowledge of the whole nature of any object, and become capable of defining it; that is, of stating in words its whole nature, with the utmost precision and brevity. All definitions—that is, all such clear statements in words of the nature of any object—contain essential truth for the child only so far as he has a clear, vivid background of sense-perception of the object.

So far as the writer is aware, Pestalozzi made no explicit statement to the effect that sense-perception of the objects involved was an assistance in acquiring a foreign vocabulary. Nor was he, as is well known, as much concerned with the psychology of memory as he was with clearness, fulness, vitality, and beauty of comprehension. He would have the child know the world around about him; and to know it, he must contemplate it. But like all educational reformers, Pestalozzi was more full in propounding his principles than he was in delimiting the regions outside of which they ceased to apply. He did much to popularize a fashion of speaking which easily creates the impression—whether rightly or wrongly, and despite whatever restrictions the speaker may harbor in his own mind—that objectivity is a food of which the system can never receive too much.

Pestalozzi exerted a profound influence on Horace Mann; and through him as well as through others his ideas permeated to the foundations of American education. Formalism, conventionality, and rote methods still had their champions; but the defenders of the concrete and the objective formed an ever-increasing host. Not Comenius and Pestalozzi alone, but Rousseau, Froebel, and Spencer lent their influence to the cause. The fight was virtually won long before we ourselves were children in school; so that Judd (34: 263) was fully justified in asserting, twenty years ago, that

our whole system of modern education is getting at the fact that a real meaning involves direct contact with objects and direct manipulation of them.

When we consider the amount that has been written in defence of sense-training and a form of education that is concrete, objective, and visual, we cease to wonder at the fact that the rank and file of teachers have an almost unquestioning faith in the power of such methods to function advantageously under all conceivable conditions. Van Biervliet (85) expresses the conviction of the average teacher when he says:

It is unnecessary to show that a sensation, an emotion, an image, remains more profoundly engraved in the memory the more vivid the impression by which it was produced. Fortifying the impressions, therefore, means fortifying our memories. We retain that which we have seen, but we retain infinitely better

that which we have looked at; we recollect a conversation which we have heard, but we recollect much better a statement we have listened to; we recall that which we have spoken in a natural voice, but much better that which we have solemnly declared.

In similar vein Horne (32:88) declares:

So far as possible under the limitations of the subject taught, all teaching should be objective in character, appealing to consciousness through the sensations. It is interesting physiologically that the optic nerve is as large as all the other afferent nerves combined, yet teachers rely almost entirely upon the auditory nerve, handling gingerly chalk and things. Books and talk are too exclusively our tools. As a certain Cuban remarked of a bright American girl whom he had but recently met, "Too much language." Show the objects of which you speak. Let there be demonstration. When the thing itself cannot possibly be obtained, recourse must be had to pictures, stereopticons, casts, drawings, models, and, best of all, travel. I know of a book course in botany where the members of the class did not see a plant until the final examination. This is not you, faithful reader, but ten to one you are today teaching some other subject without full appeal to the senses of your pupils.

"Ten to one you are today teaching some other subject *without full appeal to the senses of your pupils.*" Need we be surprised that the ordinary classroom teacher, none too well versed, it may be, in the principles of psychology, comes firmly to believe that appeal to the senses can never be overdone?

Horne, of course, realizes the fact that there may be excess in this appeal to the senses. He declares explicitly that teachers blunder by "requiring pupils to get from objects ideas with which they are already familiar" (32:94). But up to the present time advocates of sense-training have of necessity filled the rôle and acted the part of reformers. Of the two points of vital importance in every movement, a reformer thinks and talks almost exclusively of only one, and that one is the starting-point. If he thought just as hard and clearly about the stopping-point, instead of leaving that problem to some successor, he would cease to be a reformer and become no more than an intelligent, successful, and unknown educator.

Such, then, has been the genesis of the notion that objectivity should be of help in the acquiring of a foreign vocabulary. The

writer has ample evidence that this notion is widespread among teachers. He does not, however, find many statements to this effect in the literature of the subject with which he is familiar. Street (80) expresses this view when, describing one of those very limited and poorly-controlled experiments common to the early decades of educational research in this country, he said:

My third experiment was to test . . . the scheme of preceding the foreign symbol by the action or the object it represented, *i. e.*, pursuing with adults the system that nature pursues with the child. With adults it was found that no perceptible advantage was gained by such a method. . . . With children, however, the results are strongly in favor of employing nature's methods.

Bagster-Collins, now accepted as somewhat of a classic on the teaching of modern languages, has this to say (6:77) in regard to the use of objects and pictures:

With young children the use of objects, and, later, pictures, offers one of the most attractive introductions to the new language, and with skill can be carried on for a considerable time. It teaches a large vocabulary in a short time which the teacher can arrange as systematically as he desires and which is easy to control and build upon. The teacher knows what he has done and what is to be done. Moreover, "Anschauungsunterricht" gives the teacher and class something definite to talk about and something capable of development along various lines, grammatical as well as subject matter. The exercises can be made interesting for both young and old, for although the objects in the schoolroom and those represented in the various pictures are well known, the fact that they are learning their names in a new language brings in an important element of freshness into the instruction. Besides this the pupil is kept interested because he is conscious of his growing power. The work is simple, and he feels he can do it, that the teacher is not expecting the impossible of him. The pupil gains confidence, and hence it is not difficult to get him to talk, to ask questions as well as to answer them.

Discussing Franke's theory that such objective presentation connects the foreign symbol directly with the object, he says (6:76):

It is exceedingly doubtful whether by use of objects, etc., this is the psychological process of pupils, the view held by Franke. With mature pupils, their knowledge of the mother-

tongue is far too strong and active to be eliminated so easily. The path of association between the word and the word it stands for is far too deep. At any rate, however, it is certainly true that this kind of instruction makes the association between the object and the new symbol quicker and surer.

What is the meaning of this last statement of Bagster-Collins? On the surface it might appear that he was postulating a memorial effect from objects and pictures to be measured in terms both of reaction-time and percentage of error. The stimulus-word or stimulus-object being presented, the response comes, when we use pictures, not only more quickly but more surely. This would seem to be the precise psychological effect which we are endeavoring to examine.

But in the first place it should be noted that he is speaking of the active, not the passive, vocabulary. He affirms a closer bond between the object and the symbol, not between the foreign symbol and the vernacular symbol. Just as one set of habits must be formed if we are to recite the alphabet forwards, and an entirely different set if we are to recite it backwards, so it is one thing to react to *aedes* by saying *house*, and another thing to react to the sight of a house by saying *aedes*.

Were it not for one thing, therefore, we would interpret Bagster-Collins as meaning that a person who wishes to learn a language for colloquial purposes is helped by being shown the objects about which he may be expected to wish to converse, in order that he may learn to connect their proper foreign symbols directly with them instead of thinking first of the vernacular symbol. The thing that makes this interpretation impossible is Bagster-Collins' statement to the effect that *the vernacular symbol can not thus be eliminated*.

Two students of Latin see a house. They have both learned that *house* is *aedes*; that *aedes* is *house*. The first learned these things in connection with pictures. An illustration of a house was shown to him, and the teacher gave the foreign symbol, *aedes*. The second student did not use pictures. He learned the words in pairs: *aedes*, *house*, etc. But in the opinion of Bagster-Collins the inner mental process is essentially the same. The student who saw the picture did not eliminate the vernacular symbol; he said to

himself: "He is showing me a picture of a house. *Aedes* is *house*. *House* is *aedes*." The only difference between those who use pictures and those who do not—apart from the sight of the illustration—is that the latter hear the teacher say "*Aedes*, house," and the former do not. But spoken words are effective only in so far as they set in motion mental processes in the hearer. If the mental process is the same in both cases, the uttering of the words produces an effect which is at best quantitative. To hear another declare what I myself am thinking may make my thought more striking and impressive, but does not change its content.

If such is the case, the statement of Bagster-Collins can mean only that the setting-up of the bond between *aedes* and *house* is made quicker and surer by exposing to view a picture of a house. Whether or not this is really his doctrine is another question. It is possible that all he means to affirm is that pictures and objects, in the course of months and years, will gradually help us to become independent of the vernacular symbol. We find in his words, however, another one of those rather vague and general expressions of confidence in the worth of illustrations which we meet so frequently and which can not fail to influence the minds of teachers.

What is true of objects and pictures is equally true of dramatizations or action-games. These not only present objects before the gaze of the learner, but increase vividness by means of gesture, facial expression, or motion. The first lesson in Chickering and Hoadley (13:3) is built up on the words *I strike*, *I put on*, *I seize*, *I look at*, *I turn*. When the learner goes through the action himself, we have motor impressions added to the visual.

Direct-method teachers employ action for two purposes. The first is to illustrate, directly, the meaning of a verb. The second is to clarify an idea which they desire to convey without the use of the vernacular.

In the typical Berlitz lesson, "I pick up the box," the teacher utters the words "*Je prends*" while in the very act of taking up the box. The action is intended to be a clear and unmistakable index of the meaning of the word.

When a Berlitz teacher wishes to say in French, "Man is superior to the beasts because he has a brain," he illustrates *man* and *beasts* by indicating objects or pictures. *Superior* and *inferior*

are made clear by motions and gestures in higher and lower planes. The word *brain* has to be attacked less directly. The teacher is apt to say first, "Parce qu'il pense," striking an attitude of thought, and perhaps adding, "Ah, il pense; car l'homme a un cerveau." All this time the hands are busy with various motions and gestures about the head. Such actions are not intended to represent the action directly; for if this were the case, what was learned would not be *cerveau* or *il pense*, but *je frappe*, *je touche*, or some other idea of a similar kind germane to the action being performed.

All such actions, whether directly or only indirectly indicative of words, are used by the direct-method teacher primarily as eliminants of the vernacular. That this is a purpose worth striving to achieve is a thing which the present writer willingly admits. The question that interests him is whether such actions have any value, apart from the creation of interest and zeal in learning, in case no attempt is made to eliminate the vernacular, or if an attempt is made but without success.

In this connection a word may be said about the principles enunciated by Gouin, since he is one of the best-known exponents of the direct method. It was Gouin's theory that all languages are most easily learned by means of such dramatizations. But he attaches relatively little importance to the dramatization itself. His fundamental ideas are the following (27: 109 and *passim*);

(1) An essential condition and stimulant in the acquisition of language is the desire to describe some action or event.. Words should not be learned artificially, but functionally, in life-situations. This was his fundamental theory; developed, as is well known, when after months of futile efforts to learn German, he saw a small child make notable progress in expression because of a visit to a mill and his desire to describe what he had seen there. The essential thing, then, is a purpose, an end; we must wish to speak of something we ourselves have experienced.

(2) In any such description of an experience, the verb is the chief element; the other parts of speech are to be learned and used as adjuncts to the verb.

(3) In addition, he insists on the principles of brevity, clearness, and order. "Tel est l'art, ou plus modestement, tels sont les principes qui président à la genèse de tous nos exercices" (27: 109).

Gouin gives examples of the application of his system to Latin and Greek. The following is one of his action-games. The *end* or *purpose* is to describe the act of leaving the room. The lesson proceeds as follows:

Ad portam pergo
ad portam appropinquo
ad portam pervenio
ad portam subsisto
brachium porrigo
ansam prehendo
ansam torqueo, etc.

The same lesson in Greek proceeds as follows:

ἄνοιγ' ὦ τὴν θύραν

ἔρχομαι πρὸς τὴν θύραν.

πλησιάζω τῇ θύρᾳ.

παραγίνομαι τῇ θύρᾳ.

ἐφίσταμαι ἔγγυς τῆς θύρας.

ἐκτείνω τὴν χεῖρα.

ἐφάπτομαι τῆς κορῶνης.

στρέφω τὴν κορῶνιν.

ἀνοίγω τὴν θύραν.

ἐπερύνω τὴν θύραν.

ἡ θύρα εἵκει.

ἡ θύρα στρέφεται ἐπὶ τοῖς στροφεῦσι.

ἀφήμι τὴν κορῶνιν.

There is no need, declares Gouin, to spend ten years in learning Latin. Exercises like the preceding are thoroughly mastered in a single lesson. "Faut-il entendre deux fois ce thème pour le savoir?" (27: 510).

The present writer used this lesson in his experiments of 1921-1922. His experimental group studied one hundred Latin words in four lessons of thirty minutes each, using dramatizations like the one just given. Half of each lesson was devoted to private

study from the printed page and to concert-drill. His control group studied the same words, but arranged in rather meaningless sentences such as are to be found in the conventional first-year Latin books. The end-tests consisted in supplying the vernacular equivalents for the Latin words. He found, not only that the experimental group had less success in learning the words, but that their comparative showing was worse in this lesson from Gouin than in any of the others.

Owing to the small number of subjects involved—595 pupils were represented in the final data—and to the failure to establish completely satisfactory controls during the course of the experiment, the writer did not publish his results; and the experiments of 1922–1923 have convinced him he was entirely right in looking upon his data as inconclusive.

Gouin, however, did not primarily recommend dramatizations as an especially *economical* way of learning a vocabulary. He himself, while attempting to learn German, had committed textbooks and dictionaries to memory by the most mechanical of methods. He freely admits the possibility of learning the meanings of words from the printed page. But such methods, he maintains, give us no functional control over the language. Dramatizations for him are a means of acquiring power to express ourselves and to understand others. Yet he undoubtedly exaggerates the power of such dramatizations to impress the meanings of words on the memory. Gouin's devotion to objective methods was a reaction against the experiences encountered by himself when using other methods. In the opinion of the present writer, these unfortunate experiences were due less to the method than to the fact that Gouin expected the impossible of himself and brought upon himself a state akin to mental paralysis through over-work. Not only can words be learned from the printed page, but they can be learned in such a way as to result in comprehension and expression alike.

SUMMARY.

(1) Pictures and action-games are used for various purposes in vocabulary-building; and in criticizing the theories of educationists and the technic of teachers we must be careful to ascertain the reasons for which they are advocated or employed.

(2) There exists a theory to the effect that pictures and action-games, in addition to other benefits, have a direct psychological effect on retention.

(3) This theory, as regards pictures, was expressed and put in practice by Comenius. It is explicitly affirmed by Street; and, so far as we can judge, implicitly affirmed by Bagster-Collins.

(4) The principle of objective presentation—the principle that we can not “get a meaning” in the best and fullest sense without contact with the object—is in itself sound. But the limits beyond which this principle does not apply have not been clearly defined. To affirm *a priori* that the principle does not apply to the learning of a foreign vocabulary would be arbitrary.

(5) None of the writers quoted discriminated between the different parts of speech when discussing the effect of objective presentation. Gouin came the nearest to doing so when he insisted that the verb should form the core of the dramatizations by means of which he would have language taught.

(2) *Experimental.*

Up to this point the authorities quoted have been for the most part practical teachers, who expressed the convictions resulting from their own experiences in the classroom. Let us now turn to the philosophers and psychologists.

At the outset it must be evident that there is an intimate connection between the question of objectivity in memory-work and that of the imageful or imageless quality of thought.

Is thought always imageful? When I think of home, do I have before my mind's eye a picture of my home? When I think of boating, are the images of water and boats and the sensations peculiar to one who goes boating revived within me?

Among the laity the term "image" is generally accepted as indicating a sort of photographic representation of the object. Among psychologists, however, it is any bodily modification—visual, auditory, kinaesthetic, or olfactory—that is temporally connected with thought and serves as a cause or condition of knowledge.

If it could be demonstrated that I can not know and remember that *cutter* means *knife* without having an image before my mind—be it a picture of a knife, or a visual or auditory representation of the words—then it would not be wholly irrational to seek to develop such images in all memory-work, or at least to take steps to make their development possible. Doubly true would the principle become if it were certain that the readiness, completeness, and sureness of knowledge were always in direct proportion to the strength and brilliancy of the image.

The present writer has no intention of attempting to solve the mooted question of imageless thought—a question which is dividing the keenest minds among the psychologists of today. He has but one purpose, and that is to prove that persons who argue from the supposed existence of the image to the necessity of intensifying and multiplying images are proceeding in an unscientific and unreasonable manner.

The first proof that may be offered for the truth of this statement is derived from the consideration of the procedure followed when a psychologist studies the content of thought. The subjects used are generally adults, and highly trained adults. Certain stimuli are presented to these subjects and their laboratory reactions are recorded. It appears certain that these subjects are able after training to describe in much fuller detail the course of the image, and even to detect its presence although it had been previously unobserved.

If the image were like an unclouded sun at mid-day, spreading in all directions the light of knowledge and illuminating the dark recesses of memory, every individual should be able to give testimony of its existence, without previous training and without any uncertainty. Such, however, is far from being the case.

In the second place, despite all the evidence that has been gathered from the laboratory introspections of trained subjects,

psychologists do not agree as to whether or not the image exists. Still greater is their uncertainty concerning its temporal relations to thought; that is, they do not know whether it precedes or follows knowledge.

Our argument is not drawn from the fact that different subjects report different experiences, for this is to be looked upon as the natural result of variety in ideational type. The point is that after so many experiments the relation of the image to thought and even its very existence remain obscure and uncertain.

It should be noted that while Aristotle and the majority of the Scholastics defend the proposition that we invariably think and remember in images, they did not discuss the question of the special type of image that should be formed in order to secure the optimal effect in memory-work. It will not be out of place briefly to review here the Scholastic doctrine on this point.

To the question as to whether we actually have, or at least can have, in the present state of our existence, intellectual cognition without accompanying phantasms, the Scholastics answer almost unanimously in the negative. Aristotle (3:141) had clearly stated that "the soul never thinks without an image." St. Thomas, (2:1; 650) giving his reasons for holding with the Philosopher, says: "Cum intellectus sit vis quaedam non utens corporali organo, nullo modo impediretur in suo actu per laesionem alicujus corporalis organi, si non requireretur ad ejus actum actus alicujus potentiae utentis organo corporali. . . . Unde manifestum est quod ad hoc quod intellectus, non solum accipiendo scientiam de novo, sed etiam utendo scientia jam acquisita, requiritur actus imaginationis et caeterarum virtutum." The gist of his argument is that if a phantasm or image were not necessary, cerebral lesions would leave the individual free to think as clearly as he had done before. This argument may be found in detail in Maher, (52:193), who follows the doctrine of the Scholastics. St. Thomas draws a second argument from our common experience of phantasms when trying to understand something. His opinion is followed by writers too numerous to mention; among others, by Donat (19:5, 82), Pesch (64:3, 69), Lahousse (45:2, 365), Boedder (8:3), Willems (90:1, 316), Mercier (54:1, 242), and Suarez (81:3, 428). Suarez cites as supporters of the same opinion Cajetan,

Ferrariensis, Scotus, Aegidius, Dionysius, St. Augustine, and St. Gregory Nazianzen.

The opposite opinion seems to have found but little favor among the Scholastics. Suarez (81:3, 428) cites as supporters Albertus Magnus and St. Bonaventure; and of the earlier philosophers, Philoponus, Simplicius, Averroes, and Avicenna. Albertus, however, seems in the passage indicated by Suarez to be speaking of cognition in the future life. Bonaventure and the others, Suarez says, defend "imageless thought" only in our most abstract cognition of God or in lofty contemplation. Some others, whose names he does not mention, held that the intellect does not depend on the phantasm in the cognition of itself or its own act.

The Scholastics defended, and very properly, the existence of an intellect in man—a principle of supra-sensitive, immaterial cognition. But this spiritual principle of cognition was found, *teste experientia*, to have an extrinsic dependence on an external organ. Man is a composite of spirit and matter; the workings of the brain and the senses condition his spiritual activities. In other words, the Scholastics postulated some neural modification in conduction units as a necessary condition of intellectual cognition.

It is inevitable that any such physiological activity should fall under some such category as visual, auditory, olfactory, kinaesthetic, or olfactory. From this point of view the Scholastics defend the thesis that we think in images, or rather with the help of images, or with dependence upon images. But they say nothing as to how numerous and vivid images must be in order to set in motion intellectual cognition or to revive our memories of the past. It is enough for them that some sort of image must be there; whether the *quantum* and the *quale* of the image will have a very close connection with the *quantum* and the *quale* of the resultant thought is a question into which they do not enter. Nor must we overlook the fact that the "image" from which the intellect weaves its thoughts may be quite transmuted before the process is completed. The image is, in fact, more like a scaffolding which is removed before the work is done than like raw material which still exists in the finished product.

The Scholastics without exception defend the thesis that man has thoughts and judgments transcending the purely material.

Even in the case of such mental processes they would postulate the image; but only as something more or less remotely prerequisite—something that the higher faculty changes and transforms by analysis, negation, and recomposition.

Certainly there is nothing in the doctrine of the Scholastics which would make it appear that to intensify the primal images is of great importance in memory-work. To attempt to fasten upon them any such view would be just as unreasonable as to accuse a man of asserting that birds must need have a dozen wings, or wings five yards in length, merely because he has said that they can not fly without them.

Turning now to more modern writers, we find that Charcot's theory that all thinking is done in words or images does not meet universal acceptance. Pohlmann (69) found that individuals do not have accurate and distinct images of the concrete contents of words. In concluding a very scholarly discussion of the question, Otis declares (62):

We *may* think in words, and when we do, the thinking may be accompanied by the action of the language mechanism. But thought—even conscious mental adjustment—is not restricted to the material of language.

Judd declares (34:156):

Such a view of the psychology of words is in the most fundamental opposition to the view which teaches that words get their meaning by calling up pictures. That view makes of words a clumsy device for reviving in the mind something more useful; namely, an image. That view is obviously disproved by all experience. It fails in the first place to explain that great host of words for which there could in the nature of the case be no image. Think of such a word as "appalling" or "inconvenient" and it will instantly be recognized that only in the most artificial way can such words be attached to pictures in the mind. But the doctrine of images fails at a second and, on the whole, more crucial point. Words grew up at first as means of social intercourse, but once they had developed they proved to be of such value to individual thought that they have very largely taken the place of all other means of individual thought. Even if images were the natural instruments of thought before words came, it is certain that now the greater part of the world's thinking is done with words. Images would be too clumsy for

the mind which has learned the use of words. A moment's consideration of what has passed through the reader's consciousness during the last few moments will convince him that he does not stop to develop pictures. The fact is that words take on a character of their own. Contrasting words are immediately recognized as opposed. Related words are thought of as capable of combination. The psychological mechanism of interpretation can be understood in terms of tendencies towards reaction. When words contrast, one feels within himself opposing tendencies. When the word "appalling" strikes the ear, one feels his muscular system respond with a cringing, expectant shock. When one hears the word "magnificent" he feels a muscular expansion long before he is able by any exercise of the imagination to place before his mind a picture of a magnificent object.

Judd, therefore, rejects visual imagery while not only accepting but even postulating kinaesthetic imagery. But it appears to the present writer that the retort to Judd's argument is simple and obvious; the succession of muscular movements or tendencies to movements which he demands would be just as "clumsy" as a series of images, and the reader who grasped the content of his paragraph without seeing any pictures may have equal confidence in the testimony of his own consciousness to the effect that he was not in a state of bodily turmoil.

Among others, Woodworth (91) admits the existence of imageless thought in individual cases. Moore has endeavored to show (56) that meaning not only can exist without the image, but actually produces it. His conclusions, however, have been challenged by Tolman (84).

To speak plainly, we have scarcely reached the point where we can agree on a definition of our terms, as is evident from Dunlap's (20) controversy with Lovejoy and Bode. And before our knowledge of such images as we may believe to exist becomes clear and exhaustive, one that is new or little-thought-of before is presented to our consideration, as when we find Dimmick (18) declaring that "the memory after-image belongs where its name implies, between the after-image and the memory-image."

If we turn now to those who have worked particularly in the field of memory, we find the same general lack of agreement. "That which characterizes a person's type of memory," says Lyon

(49), "that which makes him, for example, of the *visual* type rather than the *auditory*, is that he has the habit of *preferring* visual images in his various mental operations. . . . The larger part of the memory images as recalled by an adult are in the form of *words*." Here we have it implied, if not directly stated, that we use images not only in imprinting, but *in our various mental operations*. This view is flatly contradicted by Bergson (7), whom Rusk (75:82-84) explains and interprets in a passage worthy of notice.

The two forms of retention where only a disposition of the experience is preserved and where the whole experience can with a certain fidelity be reproduced correspond with the two forms of memory distinguished by Bergson, and designated by him the "habit" memory and the "pure" memory. "There are," according to Bergson, "two memories which are profoundly distinct: the one, fixed in the organism, is nothing else but the complete set of intelligently constructed mechanisms which ensure the appropriate reply to the various possible demands. This memory enables us to adapt ourselves to the present situation; through it the actions to which we are subject prolong themselves into reactions that are sometimes accomplished, sometimes merely nascent, but always more or less appropriate. Habit rather than memory, it acts our past experience but does not call up its image. The other is true memory; co-extensive with consciousness it retains and ranges alongside of each other all our states in the order in which they occur, leaving to each fact its place and consequently marking its date, truly moving in the past and not, like the first, in an ever-renewed present." His view he summarizes in the sentence: "The past survives under two distinct forms: first, in motor mechanism, secondly in independent recollection."

Of the former Bergson gives as illustration the learning of a lesson "by heart," and continues: "The memory of the lesson, which is remembered in the sense of learnt by heart, has all the marks of a habit. Like a habit, it is acquired by the repetition of the same effort. Like a habit, it demands first a decomposition and then a recomposition of the whole action. Lastly, like every habitual bodily exercise, it is stored up in a mechanism which is set in motion as a whole by an initial impulse, in a closed system of automatic movements which succeed each other in the same order and, altogether, takes the same length of time." The pure memory, he affirms, "records, in the form of memory-images, all the events of our daily life as they occur in time;

it neglects no detail; it leaves to each fact, to each gesture, its place and date. Regardless of utility or of practical application, it stores up the past by the mere necessity of its own nature." When in free association tests we require of the subjects accounts of the images reproduced on the mention of the stimulus words it is the pure memory, in Bergson's sense, that we are depending on, and the images which children recall on such occasions possess the space and time indices which, according to Bergson, characterize the pure memory. When we investigate the methods of learning or of memorizing it is with the habit memory that we are dealing.

The two forms of memory are, for Bergson, fundamentally distinct; the habit memory or "the useful memory," as he calls it, has an organic basis, and belongs to the sphere of matter; the pure memory enables us to abandon matter for spirit. Both, however, undoubtedly involve "retention;" the reinstatement of a past scene as well as the reproduction of intellectual work previously learnt imply that both have been retained. With the child, too, both memories are implicated in one another, and it is only late in his development that he comes to disassociate the process of learning from the incidents accompanying the learning and is able to recall the lesson without the latter adhering; that is, to dissociate the habit memory from the pure memory, and thus attain to imageless memorizing.

In the past it was usual to base memory on imagery, just as thought was considered impossible without imagery, but according to Bergson's view the habit memory is imageless. Were memory dependent on imagery, there should be a positive correlation between amount of imagery and high standing in memory work, but experimental investigation fails to confirm this. If Bergson's two forms of memory are independent, it may be necessary to reconsider the teaching processes and determine on which form of memory the latter are respectively dependent; the learning of tables, formulae, etc., doubtless depends on the habit memory, and the recollection of a geographical feature once seen or of a historic incident once constructed in imagination belongs to the sphere of pure memory. It will also be further necessary to abandon the idea that the school subjects involving the habit memory can best be taught by invoking a special type of imagery.

Quotations such as this should indicate both the caution to be observed in using imagery as an aid to memory in school-work, and the benefits that may be expected from a further study of the connection between the two.

The causal connection between image and memory is therefore uncertain. Moreover, when images are known to exist (and the fact that they are frequently concomitants of thought is beyond question), it is known that they are often unreliable guides. Thus Kuhlmann (43), in a study of memory-consciousness for pictures of familiar objects, found that many memory-illusions occurred; and the same author (42), in an analysis of auditory memory-consciousness, found a Protean mutability in the image, which sometimes took the form of the animal or thing producing the sound, or of the motions made in its production, and again was converted into purely arbitrary analogues, as when the tolling of a bell evoked the image of a funeral.

Again, the fact that certain material is most easily recalled in images does not tend to prove that it is best learned by means of the same images. Years ago Angell (1:163) observed:

It might seem . . . that if any individual learns most readily by hearing, he would tend to recall the material learned in terms of sound. . . . As a matter of fact, this is not necessarily the case. An individual may learn most readily through the ear, and still convert the material learned into some other form, such as visual. . . . Moreover, it does not follow that the form in which one learns most quickly—it may be, for example, through the eye—is necessarily always the one in which memory is most tenacious. Indeed, it may be true that the greater effort required to secure control over material by the use of a less preferred sense, may result in a more enduring mastery of the material thus gained.

It would thus appear to be altogether unsafe to select the imagery to be used in imprinting on the basis of the imagery that chances to accompany optimal reproduction. This opinion receives support from the statement of Titchener (83), himself one of the staunchest defenders of imageful thought:

Popular psychology regards the memory-image as a stable copy of past perception, and the image of imagination as subject to kaleidoscopic change. As a matter of fact, it is the memory-image that varies, and the image of imagination that is stable.

Gruender (28:274) has observed:

Modern experimental methods have revealed two facts concerning the relation of images to thought. . . . The first fact is

that different persons differ considerably with regard to the images which they experience when thinking of one and the same object. . . . The second fact is this. In one and the same individual images vary considerably with the concrete conditions in which he finds himself, so that there is hardly any one who experiences on two successive occasions the same images in every detail when thinking of one and the same object.

The multiplication of imagery introduces a distracting element into the learning-process. Morgan (57) has shown that distraction produces an injurious effect which is noticeable in tests for immediate, and far more so, in those for prolonged recall. For all these reasons we may conclude with Watt (87):

In the first place, it must be emphasized that there is not the slightest use in multiplying forms of imagery in the process of learning in the hope that memory will thereby be stronger and more reliable. Energy should be concentrated on one method so that it becomes reliable. To rely on a second method is simply to learn the whole thing over again as if it were new. There is, then, no need to read aloud, if merely looking over what is to be learned suffices; nor should we write out words, phrases, or conversations if they remain in the memory when merely heard.

As a result of the facts here given and the opinions quoted, we may, before passing to the next consideration, lay down five principles that have a universal application to the subject under examination.

(1) Theories as to the connection between imagery and thought are unreliable and even deceptive guides.

(2) Experimental studies in any kind of reproductive process yield no clue as to the means to be employed in learning, for the type of imagery may have been radically altered between the time of learning and that of reproducing.

(3) Modifications of the material during the period of storing will, under properly controlled conditions, lead to useful information concerning the modality under which children learn best.

(4) Conclusions drawn should be referred only to the sex, age, and type of learning involved in the experiment.

(5) The aim should be to find what suits the average child. Since we know that ideational types differ, we may expect to secure contradictory results if we work with only scores or even hundreds of individuals.

METHODS OF IMPRINTING MEMORIAL MATERIAL.

The following are the principal ways in which material to be memorized may be presented to the learner.

SIMPLE METHODS.

(1) Visual Imprinting. In this case the material is exposed in printed or written form, and the learner is instructed to suppress articulation.

(2) Auditory Imprinting. In this case the material is read aloud or spoken by the experimenter.

(3) Motor Imprinting. In this case the material, having of necessity been presented once either visually or orally, is repeated aloud by the learner, the repetitions being secured by reiterated acts of pronouncing instead of by acts of seeing or hearing.

(4) Graphic Imprinting. In this case the learner writes and re-writes the material; which, as in the preceding method, must first have been made known to him by sight or hearing.

This last is the method used by teachers who require delinquent pupils to write one hundred times, "I must not omit my home-work" in order that they "may never forget it as long as they live."

COMPLEX METHODS.

(1) Visual-Auditory. The material is exposed in printed or written form, and is simultaneously read aloud to the subject by the experimenter.

(2) Visual-Motor. The learner sees the material and reads it aloud.

(3) Visual-Graphic. The learner sees and copies out the material.

(4) Auditory-Motor. The material is read aloud by the experimenter and repeated in the same manner by the learner.

(5) Visual-Auditory-Motor. The learner sees, hears, and reads aloud the material.

(6) Visual-Auditory-Graphic. The learner sees the material, hears it read, and makes a written copy or copies of it.

(7) Visual-Auditory-Graphic-Motor. The learner sees the material, hears it read, makes a written copy of it, and pronounces it aloud.

(8) Visual-Imaginal. The learner not only sees the material, but also endeavors to form a mental image of the objects represented by the symbols. This imaginal element can be added to any of the foregoing methods to form new combinations.

MODIFICATIONS OF THE MATERIAL IN IMPRINTING.

The material to be presented to the learner may be modified so as to produce a more or less striking effect. In the case of *objects* the following modifications are possible:

(1) Vividness. This may be secured in various ways: By using a brighter color, such as crimson or green; by increasing the illumination under which the material is exposed; by varying colors so as to secure greater contrast.

(2) Form. The edges of the objects may be notched, or letters of an unusual appearance may be used.

(3) Size. The objects or letters may be increased in size without having their form or color changed; thus 18-point type may be used in place of 12-point, etc.

In the case of *sounds* we have the following modifications:

(1) Intensity. The sounds may be made louder, as when the same tuning-fork is struck with different degrees of force.

(2) Timbre or Emotion. Violin tones can be produced with or without *vibrato*. Without changing the pitch or volume of our voice, we may put more feeling into what we say. Here we may recall the statement of Van Biervliet, already quoted (85):

An image remains more profoundly engraved in the memory the more vivid the impression by which it was produced. . . .

We recall that which we have spoken in a natural voice, but much better that which we have solemnly declared.

Meumann (55:17) likewise declares:

The associative power or valence of a content of consciousness increases with increase of attention devoted to it, and with increase of emotion or interest aroused by it. There are, however, certain extreme conditions of internal excitation which constitute an exception to this rule. When the concentration of attention and the intensity of emotion exceed a certain limit they may bring about a decrease of associative capacity; indeed they may give rise to a complete inhibition of association. It seems probable that in such cases the extraordinary degree of internal excitation consumes an excess of psycho-physical energy, which is withdrawn from the intellectual processes.

We are now in a position to understand better the following experimental studies of methods of imprinting.

Experimental Comparisons of Simple Methods of Imprinting.

Finzi (22) found that visual impressions are less subject to falsification than auditory impressions. Müller and Schumann (59) and Müller and Pilzecker (58) report similar findings. Calkins (11), in testing for deferred recall, reports percentages of 34.9 for auditory words, 48.2 for visual words, and 74.5 for pictured objects. Münsterberg (60), experimenting with the visual and auditory presentation of colors and numbers, found that the percentage of error in the visual series was 20.5; and in the audible, 31.6. The comparatively low degree of reliability of auditory memory receives confirmation from the study of Whipple (89) on memory for the pitch of tones. He found that when the subject was certain he was right, he was wrong in 48.9% of the cases.

But on the other hand A. Pohlmann, reported in Meumann (55:151 ff.), experimenting with familiar significant material, two-syllable names of concrete objects, and concrete objects themselves, reports that auditory presentation, on the average, produced better results than visual presentation. Kensies (38) tested auditory and visual presentations of Latin words and nonsense-words with school-children, and found auditory presentation to be the best at all times. Henmon (31), in a carefully-controlled

but limited experiment, used as his material nouns, syllables, and numbers. The material was either read to the subjects—six students of psychology—or typewritten and exposed by means of a revolving drum. He reports that auditory presentation is superior to visual when there is question of the immediate memory of adults.

We may therefore conclude that caution is to be observed in making any general and universal statement concerning the relative value of visual and auditory presentation. It appears probable that the modality under which children learn best is a function of their school age. Such was the opinion of Meumann (55:152). Littwin (46) explains this by the fact that in the lower classes instruction is addressed more to the ear, while in the upper classes visual presentation is more prominent. This conclusion is in agreement with the findings of Conway (40), who states that when children enter school their auditory memory is best; but that after they have been in school for some time, their visual memory becomes superior. Colvin (15:168) says that "writing . . . should never be used with younger children as an aid in memorization. It seems positively to be a distraction." Schulze affirms that a decrease in memory-power appears with both boys and girls from 14 to 17 (76:256). We must also consider the diversity in the material to be learned; thus Kay's statement (39:316) that "the ear is the organ that should be chiefly employed in the learning of a foreign language" may have a psychological as well as a practical foundation. Laird, Remmer, and Peterson (46) have shown that the degree of organization of the material will affect retention; and while shorter material is more rapidly learned, Robinson and Heron (73) have shown that it is, strange to say, more quickly forgotten. Another factor that can not be disregarded is the difference between various ideational types. Inability or disinclination to receive impressions under a certain modality may persist in spite of school-training. Fränkl (25) and Segal (78) found that the value of presentation differed with different ideational types. Numerous writers have advised learners to use their own ideational type when memorizing. Radossawljewitsch, however, believes (71) that few persons know which type of memory is most advantageous in their own case.

The fact that such divergent results have followed from the experimental comparisons of visual and auditory presentation is due to failure to isolate and control factors such as those just mentioned, but more especially to the use of groups too small to produce data that can be applied to the average child. Why psychologists should continue to be baffled and disturbed by contradictory results when but six, twelve, or thirty subjects have been used is a thing difficult to understand.

Experimental Comparisons of Complex Methods of Imprinting.

Münsterberg (60) found that a "series of presentations offered to two senses at the same time is much more easily reproduced than if given only to sight or only to hearing." In a study of the memory-image, Burt (10) found that motor reinforcement by tracing the outline of the figure during fixation tended to facilitate the arousing of visual imagery of the figure. W. A. Lay (47), examining the influence of kinaesthetic factors (articulatory and graphic) on visual and auditory presentation, found that graphic and articulatory movements reduced the number of errors. Street (80), reporting an experiment of Miss Smith, states that if subjects who were learning the deaf-and-dumb alphabet were allowed to make the signs as well as see them, retentiveness was increased from 13 to 20%. Cohn (14) reports results similar to those of Münsterberg. Subjects who read consonants aloud (visual-motor presentation) remembered more than when they suppressed articulatory movements. Smedley (79) studied the immediate memory of school-children for digits, and found that visual-auditory imprinting was superior to either visual or auditory alone, and that visual-auditory-motor was better than visual-auditory. Kirkpatrick (41), experimenting with normal-school students and using words as his material, found that the addition of a graphic factor to visual imprinting gave poorer results, while the inclusion of the imaginal factor (the students forming mental images of the words) gave increased efficiency in the test for deferred recall. But Mead (53) found, in a rather limited experiment, that visualization was not an assistance to memory in learning spelling. Henmon (31) found that auditory-

visual and auditory-visual-motor presentation were superior to visual.

But other experimenters report data diametrically opposed to those just presented. A. Pohlmann, reported by Meumann (55:151 ff.) found that auditory-motor-visual presentation gave poorer results than either auditory or visual. An interesting study was reported by Guillet (29). The experiment was suggested to him by the sight of his child studying the names of birds from a brightly colored picture-book. Wishing to compare retentiveness in child and adult, he set himself to learning the names of the same birds in Japanese, of which language he had no knowledge. He secured a Japanese teacher and applied himself to the task of learning the names. From this as a beginning the experiment developed into a study of different methods of imprinting. In the case of one series of fifty-two animals, his teacher merely repeated the names while Mr. Guillet looked at the pictures; in the case of a second series of forty-six animals, his teacher not only pronounced the names, but also showed him the same in writing. While the addition of the written name brought about quicker habituation in the case of the second series, his record in a re-test after six weeks was two and one-half times as bad for the series in which the written names had been shown. From this Guillet concludes:

The visual image seems to make for clearness, though not for permanence, of impression The addition of the visual word-sign made fewer repetitions necessary for my learning of the words, but was of doubtful value for their retention. The lack of the visual image seems to make for a deeper motor and auditory impression and a solidier attainment.

Quantz (70) likewise declares, after a study of the visual and auditory memory-spans for words: "The use of the eye and ear together, the words being read aloud by the subject, is little advantage over either separately, when the words are read to him or silently by him." Schuyten (77), using as his material eight two-place numbers, found that auditory imprinting alone was better than visual-auditory. Fuchs and Hagenmüller (26) and Itchner (33), seeking to verify Lay's findings concerning the influence of kinaesthetic factors, report that in their experiments

these factors did not exert the influence claimed by the latter. Henmon (31) found that visual-auditory imprinting was inferior to auditory; and visual-auditory-motor, to auditory and visual-auditory. He concludes: "Articulation or vocalization is of little value for immediate memory."

Experiments in the Modification of the Material.

Curtis and Foster (17), in an experiment to determine the relative importance of size and intensity as determinants of attention, exposed Greek crosses, some of different sizes, some more brightly illuminated. Their data were secured from the introspections of the subjects, all of whom were highly practiced observers. Their findings were that intensity has more effect than size. Numerous experiments of a similar kind, showing that vividness, irregularity of outline, and size affect both the memory after-image and retention, could be cited.

When brightness or size is the only variable factor, the result is usually a very striking difference in the total memorial effect. A drab object exposed three times is far less impressive than a bright one seen an equal number of times under high illumination. It is only when we include frequency as a second variant that we discover how relatively unimportant vividness is. Calkins (12), experimenting with numbers and colors exposed in series, the purpose being to discover the extent to which the proper number was associated with the color, found that only 9% of the correct associations were due to vividness, and 28.7% to frequency. She concludes: "Frequency has been the most constant factor of suggestibility." Murray (61), studying the appearance in consciousness of the memory after-image, used four geometrical figures of different colors and sizes. Her results were negative; comparatively little effect was produced by the variations in the peripheral factors. In this first experiment fixation of the eyes was rigid; in a second, the subject was instructed to explore the outline of the figure. Her conclusions were:

Neither the attributes of the stimulus, qualitative or spatial, nor the general ocular movements to which these attributes may give rise, constitute the important differential factor in visual reproduction. On the contrary, reappearance and persistence,

distinctness and general accuracy of reproduction are conditioned primarily upon the relation of the stimulus or image to central conditions and upon certain special motor phenomena accompanying fixation.

It should be noted that "vivid" and "irregular" are essentially relative terms. An object can possess these qualities only in contradistinction to other objects. It is therefore apparent that these qualities can under any conditions be of but limited assistance to the memory.

Experiments Bearing Directly on the Present Study.

Whatever may be the value, from the standpoint of the psychology of memory, of the experiments we have described, it must be admitted that none of them bears directly on our problem. For to hear, pronounce, or transcribe the symbol as well as to see it; or to render material more vivid by modifying its color, illumination, size, or shape is not the same as exposing both the symbol and the object represented by it. Indirectly, however, these experiments do shed light on the question we are attacking, in as much as they cause us to challenge or even to deny the principle that the more numerous the avenues through which material is presented, the more completely and permanently will it be retained.

This principle holds true up to a certain point. For among various methods of presentation, it is natural to find that one should be better—even conspicuously better—than others. This better method may differ for different learners. If, then, ignorant of which method is best for each, or even for any, learner, we present material under different forms, we may expect to find that the result is better than if we used a single method of presentation which suited some learners poorly, and some not at all. But it should be carefully noted that whatever beneficial results follow from such a procedure must always be due to the fact that our ignorance of some one certainly good method makes advisable an empirical sampling of many methods. Thus while we can argue, both *a priori* and in the light of common classroom experience, that the simultaneous use of two methods may under certain conditions be desirable, we certainly dare not affirm with-

out experimental evidence that it is *per se* economical to combine with a method capable, say, of producing 70 per cent efficiency, some other one capable of producing 60 per cent efficiency. In other words, if students learn better by seeing the stimulus-word than by hearing it, we can not argue that we will secure better results by presenting it under both forms than by having them hear it only. For the use of the two methods simultaneously consumes time and introduces a distracting element. It may be better to use a poor method than a combination of a poor and a good one.

Turning now to two experiments that bear directly on our problem, we find to our regret that one is hopelessly incomplete from the statistical standpoint; while the other loses all its value for us if stripped of the fallacious deductions drawn from it by its author.

The first experiment is that of Street (80), to which reference has already been made. This experiment was reported in 1897, and is described in the vague and general fashion that characterized educational research thirty years ago.

My third experiment was to test, quantitatively and qualitatively, the scheme of preceding the foreign term by the action or the object it represented; *i. e.*, pursuing with adults the system that nature pursues with the child. With adults it was found that no perceptible advantage was gained by such a method. . . . With children, however, the results are strongly in favor of employing nature's methods.

The paucity of data renders any criticism of this experiment impossible. Were enough children tested to give us a random sampling of the school-population? Did the same children learn different words by the two methods under discussion; and if so, what steps were taken to establish the intrinsic difficulty of the two blocks of words? If the children were paired off into groups, some studying by one method and some by the other, were measures adopted to insure equality of learning-ability in the two groups? What was the character of the words used? Did they represent familiar objects? If they represented unfamiliar objects, may not the introduction of the objects themselves have functioned merely as an eliminant of the reluctance children feel to learning meaningless material? What tests were given? Did they measure rapidity

of learning or permanence of retention? These are all questions that must be answered before the conclusions drawn from the experiment by its author can be accepted.

The second experiment is that of Peterson (66). This experiment provides evidence, which we may accept without comment, that objects are remembered much better than nouns; and actions, than verbs. The conclusion drawn from the experiment by its author is as follows:

The practical value of the foregoing discussion will be found in its bearing upon the acquisition of language. . . . If it is important that one become able as speedily as possible to grasp the meaning of foreign words, the results of the foregoing investigation indicate the method one should adopt.

We have said that this deduction is not valid. The reason is that the author endeavors to establish a general law from a few isolated instances. What does Peterson's experiment show? It shows this; that if, for example, I see a person weeping and my Latin tutor says to me "Flet," I will associate *flet* with the act of weeping more quickly than I could associate the Latin symbol *flet* with its English equivalent *he weeps*. But this does not justify the general statement, applicable to all language-work, that this "indicates the method one should adopt." For in the first place we have many words that can not be represented at all in any such objective way. In the second place, while it is a simple matter in an experiment involving only a few dozen words to select words that can be clearly and quickly represented by objects or actions, we find that the difficulty becomes cumulative when we must handle larger groups of words, many of them synonyms or near-synonyms. If I have used a certain attitude and a certain facial expression to represent *despicio*, what am I to do when I come to *contemno*? The meaning, we admit, can be made clear, but only by means of added motions or oral explanations, all of which consume time; and hence an experiment such as Peterson's is not at all typical of actual teaching conditions.

The present writer has no intention of attacking the direct method. The chief purpose of that method is to teach a vocabulary in a functional manner. It aims to give us the feeling of being at home in a foreign language. It looks forward to the time when

•

we shall be able to think and converse directly in the foreign symbols. To learn a vocabulary is one thing; to use it is another. Hence the direct method would not stand condemned because more time was required for the learning of a vocabulary if while learning it the pupil also acquired power, as we may believe to be the case, to *use* the vocabulary he had mastered.

It would be unfair to attribute to Peterson any intention of extending his principle to cover the teaching of language by the *indirect* method. Under the indirect method we constantly insist that the pupil learn to associate, not the object and the foreign symbol, but the foreign symbol and the vernacular symbol. We do not hold out our hand and inquire, "What is this?" but rather ask, "What does *manus* mean?" This association has to be set up. Let us call it Association A. The association between the object and the foreign symbol we will call Association B. Let us now assume that not only in the case of a few words, but for the entire vocabulary, Association B can be more rapidly and permanently set up than Association A. Would that render valid the following argument?

Association B is more rapidly set up than Association A.

Therefore Association B *plus* Association A is more rapidly set up than Association A alone.

Only on one condition would this be verified; namely, if Association B so reinforces Association A that the combination is economical. It might be that to establish Association A (between the foreign symbol *manus* and the vernacular symbol *hand*) would require ten repetitions. It might also be that these ten repetitions would be reduced to five if we combined with them one, two, or three exposures or displays of an actual hand, or of an illustration of one.

Whether or not such is the case is the precise question we are considering in this study.

SUMMARY AND CONCLUSIONS.

1. As regards simple methods of imprinting, the factual evidence at hand does not show a marked and general superiority of one method over another.

2. There is an equal conflict of evidence and opinion concerning complex methods of imprinting.

3. We lack data that conclusively show any advantage to be derived from motor reinforcement and visualization.

4. There is no clear evidence of advantages to be secured by bringing about habituation through two or more senses or under two or more modalities.

5. Any such evidence, if it did exist, would be but suggestive in so far as our own problem is concerned.

6. The experiment of Street bears directly on our problem, but was too incompletely reported to merit much consideration.

7. Peterson's experiment has application to the direct method, but not to the indirect.

8. The factors that determine the establishing of the nexus between symbol and meaning appear to be central rather than peripheral. Attention, interest, and determination to master the material are of such paramount importance that other elements sink into insignificance.

CHAPTER IV.

THE ORGANIZATION OF THE PRESENT EXPERIMENT.

The Purpose of the Experiment.—The purpose of the experiment was to ascertain whether the learning of a Latin vocabulary would be facilitated by displaying the object represented by the symbols and performing or seeing performed the action, and by having before the eyes during the period of study pictures representing these objects and actions.

The Material of the Experiment.—The material consisted of one hundred Latin words; thirty nouns, thirty adjectives, and forty verbs. The word *est* also appeared in the lessons, but was not included in the tests. Owing to the necessity of finding words for which no classical equivalents existed and of avoiding phrases, circumlocutions, and compound words, some words were arbitrarily given new meanings or even coined outright. A statement to this effect was included in the printed lessons.

The following principles governed the selection of the words:

1. In the case of nouns, the objects represented by them were not to be so small as not to be easily seen when displayed before a class of children.

2. The objects were not to be too large to be carried by a tachistoscope or other precision-device in case the experiment was ever to be repeated under laboratory conditions. The author himself advisedly refrained from adopting this procedure, chiefly because of his feeling that children are apt so to be distracted by the mechanism as to render the results of the experiment too little indicative of what may be expected under normal classroom conditions.

3. The objects were to be such that they could be clearly and unmistakably illustrated by a picture.

4. They were to be cheap and easily procurable anywhere.

5. They were to be familiar to all children, but some were to appeal more to boys, and others to girls.

6. Each object was to possess some quality capable of being represented in a picture. Thus "The hook is bent," "The cheek is signed," *etc.*, were considered acceptable combinations; but combinations such as "The sugar is sweet" or "The lead is heavy" were rejected.

7. The verbs were to represent actions that could be performed without disturbance in the classroom. These actions were to be capable of being represented by pictures which, so far as possible, would stand exclusively for one thing.

8. These actions were to be familiar to all children. But two unfamiliar actions (*I stipple* and *I hatch*) were introduced; for although the experiment was to deal with familiar things and actions, it seemed justifiable to depart from the principle to this slight extent in order to gain some inkling of what diverse results might follow from the element of unfamiliarity.

The Organization of the Experiment.—There were six lessons containing five nouns and five adjectives each, all thrown into sentences of "The soldier is brave" type. There were four lessons containing on the average ten verbs each, arranged in the form of simple action-games. This material was then thrown into two forms, Form A and Form B. In Form A five of the ten lessons were illustrated, and the other five were printed on smaller sheets without illustrations. In Form B the illustrated lessons of Form A were unillustrated, and *vice versa*.

All the subjects involved in the experiment learned the entire one hundred words, half of them objectively and the other half non-objectively.

The arrangement of the lessons will be best understood from the facsimiles to be found in the appendix, page 163.

Controls.—The necessity of equating the subjects was avoided by having all the pupils learn half the words by each of the two methods under investigation. Thus each pupil was matched against himself rather than against others. A further guarantee

of the equal distribution of ability may be found in the size of the groups.

In his experiment of 1921-1922, already referred to, the author found that the coefficient of correlation between intelligence and memory, computed for 174 children by the product-moment formula, was only $.12 \pm .04$. In this experiment, of the two children who ranked lowest in intelligence, one made a score of 100; and the other, of 96.

It is known that even definitely feeble-minded children may have excellent memories. Since it appears indisputable that verbal memory is the factor which in this experiment does most to influence success, any attempt to equate the subjects on the basis of intelligence seemed to be of extremely doubtful value.

A further control consisted in reversals of the order. Certain groups studied the illustrated lessons first, while others took them last. Again, certain groups began with the first of the illustrated or unillustrated lessons, and others began with the last and worked back to the first.

These various distributions of material and order are represented by the following symbols, which will be frequently referred to in the course of this study.

SYMBOLS USED

SYMBOL	FORM USED	ORDER OF LESSONS
AQ	A	1-5; 6-10
AR	A	5-1; 10-6
AS	A	6-10; 1-5
AT	A	10-6; 5-1
BQ	B	1-5; 6-10
BR	B	5-1; 6-10
BS	B	6-10; 1-5
BT	B	10-6; 5-1

Number and Length of Lessons.—The teaching of each block of fifty words required six lessons, each lesson being fifteen minutes in length. There were two lessons each day, one in the morning and one in the afternoon. The first and second of the lessons to be taken were taught on Monday; the third and fourth, on Tues-

day; the fifth, on Wednesday morning. Wednesday afternoon there was a repetition of all five lessons. The following week the same procedure was followed with the other block of lessons, illustrated or unillustrated as the case might be.

The lessons in which objects, actions, and pictures were used were designated the objective lessons, and the others were called the non-objective. These two terms are represented in this report by the symbols O and N respectively.

Tests.—The test for immediate recall was had the morning of the day after the repetition that concluded the work of the week in question; that is, on Thursday morning. Printed blanks were provided containing the Latin words, after each one of which the pupils were to write the English equivalent. Fifteen minutes was allowed. The pupils were required to state on these blanks whether they had been absent from any of the lessons.

The test for deferred recall was given four weeks after the test that completed the work of the second week. Both blanks were given out simultaneously, and forty minutes was allowed. Great insistence was placed on the necessity of having this examination come as a complete surprise, and no evidence came to hand during the progress of the work of any violation of this rule.

The original plan had been to give two tests for deferred recall, one four weeks after the test that ended the first week's work, the other four weeks after the test that ended the second week's work. But scarcely had the experiment gotten under way than it became evident that the wastage due to absences would be extremely heavy. Since fewer pupils would surely be absent on any single Thursday than on two successive Thursdays, the decision was made to have both tests on the same day. The announcement of this change reached a few schools too late for them to observe the new ruling.

The Time of the Experiment.—All the experimental work was done during January, February, and March of the year 1923.

Schools and Subjects Involved.—The number of schools taking part in the experiment was 131. Of these, twelve were public schools; nine in St. Louis, Missouri, two in Omaha, Nebraska, and one in Jerseyville, Illinois. The remaining schools were parochial

schools. The geographical distribution of all the schools participating was as follows:

Illinois	37
Indiana	9
Iowa	11
Kentucky	9
Massachusetts	8
Missouri	9
Nebraska	2
Ohio	37
Wisconsin	9
Total	131

The subjects were eighth- and sixth-grade pupils. These classes were chosen for three reasons. First, they were pupils who had neither studied Latin nor were in contact with others who were studying that language. Secondly, they were about the age when Latin is commonly begun, thus giving practical value to the data. Thirdly, seventh grade was omitted because a reasonably accurate idea of what might be expected there could be secured from the two contiguous classes.

These subjects numbered 10,753. Of these, 1,503 were public-school pupils. Although the public schools were fewer in number, they supplied about 15 per cent of the subjects.

A comparatively small number of the subjects were ninth- or seventh-grade pupils. In tabulating the scores, these subjects were added to those nearest them in school-age. Ninth-grade pupils were combined with eighth-grade; seventh-grade, third-quarter, with eighth-grade; seventh-grade, first-quarter, with sixth-grade.

A rule was made, and rigidly adhered to, that the scores of any pupil who had missed even a single lesson during either of the two weeks would be rejected. With this intention in mind, the author secured as many subjects as he did in order to be able to present about five thousand complete scores. The loss, however, was greater than his worst apprehensions had ever led him to anticipate. This loss was due to four causes:

1. Absences from school due to temporary indisposition.
2. An influenza epidemic which raged in certain localities, and in consequence of which a number of schools were quarantined after a portion of the work had been done.
3. Semester promotions, which caused pupils to fail to be represented in the test for deferred recall.

4. *The Experimenters.*—The experimenters were the class-room teachers. About one-third of these experimenters were personally instructed by the writer or by his first assistant. The rest depended on the manual which is reproduced below.

Scoring.—The scoring, entering, and tabulating was done by the writer or under his immediate supervision. The rule for scoring was to accept no meaning except the precise one given in the lessons, but to be very liberal in regard to misspellings. The omission of the pronoun "I" in the verbs was not considered a mistake.

The "Teacher's Guide."—The manual provided for the use of experimenters is here given in full.

TEACHER'S GUIDE

FOR

A STUDY OF OBJECTIVE METHODS

I. THE PURPOSE OF THE STUDY.

The purpose of the study herein described is to gather data concerning the effect of objective methods on the learning and retention of a foreign vocabulary.

This study has been undertaken in connection with the nation-wide survey of the Latin situation now being conducted by the American Classical League. There is every reason to believe that the survey will result in the amassing of information of great value to the teaching profession. The one experiment for which the

undersigned is responsible is but a single element in an extensive and well-planned scheme.

The undersigned devoted almost an entire year to preliminary studies and experiments out of which has grown his material as now organized. He is working in close conjunction with Doctor Mason D. Gray, who is one of the principal field-workers in the American Classical League's investigation; with Doctor Albert R. Crittenden, of the Latin Department of the University of Michigan; with Doctors Guy Montrose Whipple, Charles Berry, Clifford A. Woody, and Calvin O. Davis, of the College of Education of the same university; and with Doctor Hubert Gruender, of the Department of Psychology of St. Louis University.

These names are sufficient guarantee that the rules of procedure followed and the controls established may be expected to produce data of substantial value.

The purpose, as has been said, is to determine the extent to which objective presentation facilitates the learning of a foreign vocabulary. If, for example, we wish to teach a learner that *cutter* means *a knife*, is it of advantage to show him a knife or a picture of one during the process of learning? If we desire to have him learn that *levo* means *I lift*, does it help to have him go through the act of lifting, or to see someone else do so, before or while he is committing the word to memory?

For centuries educators have believed that such objectivity was an assistance, but we still lack conclusive data on which to base a scientific judgment.

The objectivity of which we speak may function in various ways and under various conditions. Of the effects that may result from its use, one and only one is under consideration here. To avoid confusion, it will be well to state definitely which effects we do *not* desire to study.

1. We are *not* studying objective presentation as a means of enabling pupils fully and clearly to comprehend the names of objects or actions hitherto unknown to them.

Significant material is known to be more easily remembered than non-significant. The memory appears to function better if the word has a meaning, and if we possess a clear idea of the thing

it represents. Hence when presenting unfamiliar material to children, we may expect object-lessons to produce a two-fold effect—a fuller comprehension of the material presented, and a more lasting retention of what is learned.

If we teach children that *vitiparra* means a *titmouse* without telling them whether a titmouse is a beast, a bird, or an inanimate object, or showing them a picture or specimen of the thing represented by the word, we are teaching empty sounds and nothing more.

Objectivity in such cases adds meaning and assists retention. But it is not this function of objectivity that we are studying. Rather we wish to ascertain the extent to which objectivity affects the learning-process when the child already possesses a clear and full mental picture of the thing for which the word stands.

For this reason practically all the words used in our experiment stand for very common and familiar objects or actions. A mere half-dozen words that will prove strange to all or some grade-school pupils have been included. The addition of these few words will not distract us from the chief purpose of the study, and there is a probability that the data thus derived may indicate the existence of a field deserving of more thorough investigation.

2. We are *not* studying objective methods in so far as they are productive of interest and increased zeal in learning. Richly illustrated textbooks, classroom games, and collections of objective material (*Realien*) may beget a highly favorable attitude of mind on the part of the learner. On the other hand, unpleasant rote methods may disaffect the pupil and prevent him from doing the work of which he is capable.

It may be assumed, and has in fact been demonstrated by experience, that in an experiment of such short duration and so novel in character, pupils will apply themselves to their work with all the energy they can command. They are not, while studying the words that must be learned non-objectively, uninterested and sluggish. The objective lessons may prove more interesting, but not in the sense that they will make pupils work who would not work before. It is probably true as a general rule that work which is more *interesting* is also more *effective*, and *vice versa*. In studies whose purpose is to compare the merits of two methods of presen-

tation, it would seem futile to look upon interest as a factor that should be equalized or eliminated. The better method can scarcely but prove more interesting, since it enables the pupil to secure the same or superior results at the expenditure of less labor.* If the sight of the object or illustration, or the acting-out of the movement produces, of itself and inevitably, a more vigorous attack upon the material to be memorized, we should find in that fact something natural, psychological, and universal—in short, that precise law of learning which it is our purpose to investigate.

The interest which vitiates the results of psychological experiments is that which is extrinsic to the matter learned or the method of learning it. Such interest would have play if, for example, we offered some very attractive prize to those who did well in learning the objective words, offering no prize for success with the non-objective.

3. We are *not* studying objective methods as a means of teaching by the direct method. The direct method, in order to eliminate the vernacular symbol, makes liberal use of objects, illustrations, and actions. Since we do the same thing in this study, teachers frequently entertain the idea that we are making a study of the direct method. This is manifestly impossible, since the precise thing we are doing is to teach the vernacular equivalents of foreign symbols.

Our purpose is simply this: To determine whether, if we wish a pupil to remember that *culter* means *a knife*, or that *percutio* means *I strike*, it is advantageous to display a knife or a picture of one, and to have the learner go through the act of striking. We are studying the strictly psychological effect of objective presentation, all the actions and objects whose foreign symbols are studied being familiar, and the factor of adventitious interest being reduced to the minimum.

II. THE TECHNIC OF THE EXPERIMENT.

1. Pupils learn 100 Latin words (*est*, the one hundred-and-first word, is not included in the tests) in twelve lessons of fifteen minutes each.

* Facts brought to light during the course of the experiment incline the writer to doubt the truth of this statement.

2. All the pupils study half of these words objectively; seeing the objects, going through the actions, and studying the words from the printed page with pictures of the objects and actions before their eyes. The other fifty words are studied non-objectively. Thus each child, independently of comparisons with other children, will be productive of data.

3. As a control, the material is reversed, so that the fifty words studied objectively by certain groups of children are studied non-objectively by others, and *vice versa*. This is necessary because every word has a certain intrinsic difficulty; and if all the pupils who took part in the experiment learned the same fifty words objectively and did better in them, the objection could be made that the words happened to be easier. This explains the fact that the lessons are printed in two forms, A and B.

4. As an additional control, some teachers will be instructed to teach the objective words first; others, the non-objective. This is necessary because some improvement in committing to memory the meanings of foreign words may be expected to result from the first lessons. If then either method—the objective or the non-objective—were always used first, it would be placed at a disadvantage. For other similar reasons other variations in the order of presenting the lessons will be introduced; each teacher will be clearly instructed what order to follow.

5. There are five lessons of each type, and each lesson requires fifteen minutes. In addition there are reviews and tests that bring the total expenditure of time up to four clock-hours. Lessons of one type are taught one week; those of the second type, the following week. The distribution of time can be seen from the following schedule:

First Week.

Monday A. M.—Lesson 1. P. M.—Lesson 2.

Tuesday A. M.—Lesson 3. P. M.—Lesson 4.

Wednesday A. M.—Lesson 5. P. M.—Repeat all five lessons.

Thursday A. M.—Examination.

Second Week.

Monday A. M.—Lesson 6. P. M.—Lesson 7.

Tuesday A. M.—Lesson 8. P. M.—Lesson 9.

Wednesday A. M.—Lesson 10. P. M.—Repeat Lessons 6–10.

Thursday A. M.—Examination.

(The lessons may be begun on Tuesday. It is only necessary that they be taught on consecutive days.)

Four weeks after the first Thursday, the pupils are tested again (without preparation or warning) on the fifty words of the first five lessons. Four weeks after the second Thursday, they are tested on the words of the last five lessons. The purpose of these tests for delayed recall is, of course, to obtain data concerning the permanency with which the words were learned.*

6. All the studying is done during the lessons. No work at other times is permitted.

7. The lessons are taught in Grade Eight and Grade Six.

III. TIME SCHEDULE FOR EACH LESSON.

Presentation of new lesson, repetition of former lessons—6 minutes.

The pupils study the words from the printed lessons—5 minutes.

Concert-drill—4 minutes.

Total time—15 minutes.

After the lesson a very short written test (about two minutes) is given, the sole purpose of which is to accustom the pupils to the form in which the final tests are to be taken.

On the first day, when there is no previous lesson to repeat, more time is given to presenting the new lesson, to study and drill.

The division of time should not be looked upon as iron-clad. Teachers and pupils alike vary. The essential thing is to spend exactly fifteen minutes on the lesson.

IV. THINGS TO AVOID.

1. Do not under any conditions change the time (fifteen minutes) assigned to the lessons.

2. Do not be disturbed because you “don’t know much Latin.” The work is so organized that no knowledge of Latin is required. It is not in fact necessary to tell the pupils that they

* The dates set for the re-tests were changed early in the experiment. See page 58.

are studying Latin. You may refer to it as "the new language." Use whatever system of pronunciation you wish; even though it is not perfect, no harm will be done the pupils.

3. Do not under any conditions expose the objects or go through the actions represented by the fifty words that are to be studied non-objectively (without pictures). Some of the objects will be within sight of the pupils (book, pencil, ruler, etc.); act as if you did not see them. In these non-objective lessons (Lessons 1-5; the lessons without pictures), do not make any comment that might encourage the pupils then or later to think of the objects or actions represented by the words. Do not tell them to "form a mental picture of what the word means." Do not define or explain the words. Do not tell them that "ruler" in the lessons means an instrument and not a person with power to govern; or that "top" is a toy, not the uppermost part of something. Do not explain "I hatch" or "I stipple." Simply spend all your energy in getting the words as they stand into the memories of the pupils.

4. Do not permit any study whatsoever outside of the twelve fifteen-minute periods contained in the experiment. Be careful not to permit any of the pupils to retain the material or to make copies of it.

5. Do not fear that your results will be compared with those of other classes. No tabulations by schools or classes will ever be made. The average score of *your* class will never be computed. Only the gross averages will be taken. The one reason for insisting that the name of the school be written on the test-papers is that we may be able to identify each pupil and compare his second examination with his first.

6. Do not send to us the test-papers of a pupil who has missed so much as a single lesson. Only the scores of those who have had all the lessons can be counted. For this reason the pupils will be instructed to write on the test-paper how many lessons they missed. It will be well if you can keep a careful list of the absentees, for pupils sometimes claim to have missed a lesson when they did not, in order to excuse their poor showing.

7. Do not excuse deficient pupils from test, or hold back the paper of a child who has made a very poor score. We find in

almost every class pupils who can remember scarcely ten of the hundred words. The scores of these backward pupils may give us data of extreme value. It might happen, for example, that almost all the words remembered by them were learned in connection with pictures. The opportunity to study very thoroughly the apparent mental processes of pupils with scores of 10 and under will be one of the most valuable results of this experiment.

V. THINGS PERMITTED AT THE OPTION OF THE TEACHER.

1. You may give a preliminary talk explanatory of the work.
2. You may use the customary devices for securing better work, such as counting the marks, pitting one section of the class against another, offering rewards, etc. But this precaution should invariably be observed, that identically the same incentive should be used in both the picture and the no-picture lessons.
3. You may score the test-papers if you wish to know how the class succeeded. All the papers will be re-scored by us. The presence of your own marks on the papers will not cause any inconvenience or confusion.
4. You may retain all the material sent you except the test-papers, the teacher's report, and the pupils' questionnaire. Material in excess of that demanded is always sent, as it is often necessary to replace lessons torn or soiled during the progress of the work. If you wish to return material that is fit to be used again, you will confer a favor on us, but it is not necessary to do so.
5. If you experience difficulty in securing any of the objects required in the lessons, they may be had on application from the undersigned.

VI. SPECIFIC INSTRUCTIONS FOR EACH LESSON.

FORM A.

(For Form B, see page 75.)

Lesson 1. (Monday morning.)—Give every pupil a copy of Ten Language Lessons. A. Lessons 1-5.

When you are ready to begin, note on a piece of paper or the blackboard the exact time, so as to give neither more nor less than fifteen minutes to the lesson.

TEACHER: We are going to learn some words in a new language. Look at your papers and say the words after me. Say them just as I do. Est, is.

PUPILS: Est, is.

TEACHER: Flabellum, fan.

PUPILS: Flabellum, fan.

TEACHER: Apertum, open.

PUPILS: Apertum, open.

(The remaining words in the list are read in exactly the same way.)

TEACHER: Now you will see that you can understand sentences in the new language. But first I must tell you one thing. (Note—Do not omit this explanation.) In this language there is no word for “the.” The “the” is not expressed; it is understood in the other word. *Flabellum* means “the fan;” *funis* means “the rope.” It says, *Flabellum est apertum*. Who can tell me what that means?

PUPIL: The fan is open.

TEACHER: That was very good indeed. *Flabellum est apertum*, The fan is open. All repeat that.

PUPILS: *Flabellum est apertum*, The fan is open.

(Note—Be careful from the beginning to require the pupils to repeat the sentences in some orderly fashion. By gestures or other signs make them speak slowly and in unison.)

The other sentences are then treated in the same way. They are: The rope is knotted; The bottle is corked; The nail is driven; The book is bound. Then repeat the lesson from the beginning in exactly the same manner as it was first presented.

TEACHER: Now I wish you all to study these words just as hard as you can. You must learn what each word means. *Flabellum*, fan; *liber*, book. (Note—Teachers may, and in fact should, direct the pupils to study according to any special methods that are customary with them. Teachers, however, who have children learn words by writing them over and over again should be extremely careful to see that such lists are collected before the end of the lesson. This method should not be used unless the teacher is certain that she can prevent any of the pupils from retaining such lists of the words.)

While the pupils are studying, write on the board the ten words of the lesson *in a different order from that in which they occur in the printed lesson*. After three or four minutes (seven or eight minutes in all will then have passed), a concert-drill is had as follows:

TEACHER: Put aside your papers and rise. When I say the word, you must tell me what it means. Flabellum.

PUPILS: Fan.

TEACHER: Apertum.

PUPILS: Open. (Take the other words in the order in which they are printed in the lessons.)

TEACHER: Now let us take the words in a different order. (Pointing to a word on the board.) Obturata.

PUPILS: Corked. (*Note*—The teacher will usually find that the pupils do not know the words when presented in a different order. She then says:)

TEACHER: You see you did not know the words quite so well when I mixed them up. Sit down and study your words again, for we must know them all perfectly.

After about fourteen minutes in all have elapsed, have another concert-drill with the words in a different order from that on the printed page. Stop after fifteen minutes. Collect the printed lessons. Tell the pupils to take out a piece of paper. Write five of the words on the board, and say: "Write down these words and put the meaning after each one." Give only a moment or so to this, and collect what has been written. The purpose of this short test is to accustom the pupils to the final examination they shall have to take. It has been found that pupils do not do justice to themselves in the examination if they are then for the first time required to write down the vernacular equivalents of the foreign words. Always use five words only for these short tests; in the later lessons, take two words from the new lesson, and three from former lessons.

Lesson 2. (Monday afternoon.)—Read the words (*impono, I dip*, etc.) and have the pupils repeat them after you. Do this twice. Then repeat Lesson 1 just as it was taken the first time, and read Lesson 2 once more. Then follows the study-period, during which you may write the words on the board, changing

the order and including both lessons. In the drill take both lessons, asking the words first as they stand in the lessons and then as you have them on the board. If time remains, have more study or more drill at your discretion. Collect the papers and give the written test with five words.

Lesson 3. (Tuesday morning.)—The sentences are: The bag is full; The ball is new; The hook is curved; The doll is dressed; The glove is buttoned. Take the lesson as you did Lesson 1. Then begin with Lesson 1 and go through all three lessons. Study; drill.

By this time the words will have become so numerous that lack of space or time may prevent you from writing all of them on the board. Do the best you can, remembering that it is desirable to have the Latin words presented at times visually in the drill, since it is in that form that they will be given in the final test.

You may in all the lessons make note of words that are missed and use such devices as occur to you to get them learned.

In all the study-periods instruct the pupils to study the new words first and then repeat the old.

Lesson 4. (Tuesday afternoon.)—Read the lesson twice. Repeat all four lessons. Study; drill; final test with five words.

Lesson 5. (Wednesday morning.)—Read the lesson twice. Repeat all five lessons. Study; drill; final test with five words. The sentences are: The wire is insulated; The stick is notched; The pencil is long; The trap is set; The package is wrapped.

Wednesday afternoon have a repetition for fifteen minutes. Read all five lessons rapidly; let the pupils study for five or six minutes, reserving about five minutes for the drill. If you wish to include more than five words in the final written test, you may do so; but in this case the time must come out of the fifteen minutes given to the repetition. Make a mental note of your procedure during this repetition, and follow the same order when you have the repetition at the end of the second five lessons.

N. B.—The above description of the lessons gives the way in which they were presented by the author. Those who wish may follow it; but what is desired is that every teacher will give free rein to her individuality and resourcefulness and present the lessons as effectively as possible. Observe the time-limit; use no

objects; and get the fifty words learned by your class as well as you possibly can.

The Examination.—On Thursday morning, without any further repetition or study, give the examination, using the printed blanks provided for the purpose. Be sure that each pupil has a test-blank of the color proper to him. Blue for eighth-grade girls; yellow for eighth-grade boys; red for sixth-grade girls; white for sixth-grade boys. First have the pupils write their names and give the other information requested in the blanks. Then say: "These are the words we studied during the lessons. You must write after each word its meaning, just as we learned it during the lessons. You need not write the meanings in order, as the words occur on the papers you have; but if you wish you may skip here and there and write the easiest words first. If one word reminds you of another, you may hunt for that word and write down its meaning. Write very plainly and be careful of spelling. Begin now and do as well as you possibly can. You will be allowed fifteen minutes."

Allow exactly fifteen minutes from the time you finish instructing the pupils. Pencils may be used, but ink is preferred. After casting out the papers of pupils who missed any of the lessons, send the rest to the undersigned at your earliest convenience.

Lesson 6. (Monday morning.)—With Lesson 6 the objective lessons begin. These lessons differ from the others *only* in the method of presenting and studying the words. There is the same time-limit—fifteen minutes—and the same use of study, concert-drill, and short final test. As has been stated, some teachers will be instructed to begin with Lesson 6 and take the objective lessons first. (See page 64, No. 4.) If you are to begin with the objective (picture) lessons, read the preceding instructions for the first five lessons for information concerning the study, drill, and final test.

Lessons 6–10 (or Lessons 1–5 in the case of those who begin with the picture lessons) should be studied the week after the first five lessons. They may be begun either on Monday or Tuesday, but in all cases the work should be done on four consecutive days. A holiday should not be permitted to interrupt the work. If it is impossible to begin the second type of lessons the week following

the first type, they may be postponed to a later date; but whenever possible, the work should be done during two consecutive weeks.

In good season begin to gather the objects required. The pupils will be of great help in this matter, and from them may be borrowed for the occasion practically everything required.

Distribute to the pupils copies of Ten Language Lessons. A. Lessons 6-10. The five objects required being ready on your desk, proceed as follows:

TEACHER: This is a handkerchief (holding up handkerchief). Sudarium, a handkerchief. All repeat the word.

PUPILS: Sudarium, handkerchief.

TEACHER: Notice that the handkerchief is embroidered. It has an initial embroidered in the corner (showing initial). Perhaps some of you use embroidered handkerchiefs. Depictum, embroidered. All repeat the word.

PUPILS: Depictum, embroidered.

(*Note.*—The statements made by the teacher about the objects as given here are meant to be suggestive. Their general purpose should be to induce the pupils to link up the Latin word, whenever possible, with the object as they actually meet it in life. The statements should remain concise; carefully avoid waste of time.)

The remaining objects are presented in the same way, the pupils repeating the words after the teacher. The following are suggested statements:

TEACHER: The boys all know what this is. It is a top. Turbo, a top. A top has to come to a point, or it will not spin. Fastigatus, pointed. . . . This is a ruler. Amussis, ruler. . . . A ruler is no good unless it is straight. Recta, straight. . . . Here is something the girls will recognize. It is a barett. Fibula, barett. See, the barett is unfastened. Refixa, unfastened. . . . This is a check. If we present a check at the bank, we get money for it. Syngrapha, a check. . . . But of course the check must be signed. This check is signed. Subnotata, signed. . . . Now see the sentences after the lesson. Who can tell me what "Sudarium est depictum" means? (Have the sentences read and repeated as explained in Lesson 1.)

Repeat the lesson once. Study and drill, as explained in Lesson 1. When during the drill you call for the meanings of the

words, avoid a mistake into which one may easily fall—do *not* hold up the object when calling for the meaning of the word. Of course the pupils will answer “handkerchief” if you display one before them when you ask what “sudarium” means.

End with the written test, five words.

Lesson 7. (Monday afternoon.)—Before the lesson, train some one girl in the class (or boy, if only boys are present) to go through the actions involved. Use a needle with a large eye.)

TEACHER: Today we have a game which I am sure all the girls at least will easily remember. (*Note.*—The special purpose of this lesson is to discover whether a strong emotional appeal has any influence, positive or negative, when functioning in connection with objective presentation. If the opening remark causes the boys to sneer at the game, so much the better.) Watch Mary while she goes through the actions of the game, and we will all learn the words together. We have a piece of sewing to do. First we must unwind some thread. (The demonstrator unwinds some thread.) *Devolvo*, I unwind. All repeat the word. . . . Then we must break the thread. *Frango*, I break. All repeat the word. . . . Then we pick up the needle. *Assumo*, I pick up. . . . Then we thread the needle. *Insero*, I thread. . . . Then we must tie the thread. *Ligo*, I tie. . . . Next we look for the place to be sewn. *Quaero*, I look for. . . . Then we sew the tear. . . . *Consuo*, I sew. . . . And then we show our work. *Ostendo*, I show.

Repeat the lesson in exactly the same way, the demonstrator performing the actions. It will be well to have at hand three needles and three pieces of cloth; in this way the demonstrator will not be delayed by the necessity of removing the thread from the needle before the repetitions.

Repeat Lesson 6. Hold up the handkerchief again and say: “*Sudarium*, handkerchief. All repeat the word,” etc. Have the sentences read and translated, all pronouncing them together. Then repeat Lesson 7 again, the demonstrator going through the actions as before.

Study; concert-drill; written test with five words.

Lesson 8. (Tuesday morning.)—Take the lesson as you did Lesson 6. “*This*” (holding up a sealed envelope) “is an envelope. *Involuerum*, envelope. All repeat the word. . . . *This* envelope

is sealed. Agglutinatum, sealed. Repeat the word," etc. Then take the sentences as follows:

TEACHER: Who can tell me what the first sentence means?

PUPIL: The envelope is sealed.

TEACHER: Very good indeed! Involucrum est agglutinatum, The envelope is sealed. All repeat the sentence.

PUPILS: Involucrum est agglutinatum, The envelope is sealed.

The other sentences are taken in the same way. They are: The knife is closed; The needle is sharp; The box is empty; The grater is rough.

Go through the lesson once more. Then repeat Lessons 6 and 7 and 8. Study; drill, test with five words. For the drill, see comments on Lessons 1, 2, and 3. In repeating Lessons 6 and 7, *use the objects and perform the actions as when first taking the lessons.*

Lesson 9. (Tuesday afternoon.)—Before beginning the lesson, have each pupil get ready on his desk three small pieces of paper, each folded in the middle, and a pencil.

TEACHER: Today we have a game that teaches us some of the things we can do with a piece of paper. We all have (demonstrating with her own piece of paper) a piece of folded paper. First we must unfold it. Replio, I unfold. Repeat the word. . . . Then we write on it. Let us all write the words "I write." Scribo, I write. Repeat the word. Then we fold our paper. Complico, I fold. . . . Next we take our pencils and perforate it. Terebro, I perforate. . . . We tear it. Scindo, I tear. . . . We crumple it. Rugo, I crumple. Repeat the word. . . . Now place your crumpled paper in your desks and rise.

We have another game that the boys ought to like; they are more athletic than the girls. Sto, I stand up. Repeat the word. Distendo (going through the action and having the pupils do the same), I stretch. . . . The other actions are gone through in the same way. Use a pupil as demonstrator, if you wish, training him in advance.

Go through both lessons again. Then repeat all the lessons, Lessons 6, 7, 8 and 9. Study; drill; test with five words.

Lesson 10. Presented and repeated as Lesson 6. Repeat all the lessons, using the objects and demonstrating the actions.

Study; drill; test with five words. The sentences are: The bracelet is round; The paper is ruled; The letter is addressed; The marble is smooth; The flag is unfurled.

Repetition. (Wednesday afternoon.)—Repeat all the lessons; study; drill. Conduct this repetition in the same way that you conducted the one after the five lessons without pictures. (See page 70.) Use the objects and perform the actions as when the lessons were first presented.

Examination. (Thursday morning.)—See the instructions for the examination after the fifth lesson, page 71. Be sure that each pupil has a test-blank of the color proper to him. Blue for eighth-grade girls; yellow for eighth-grade boys; red for sixth-grade girls; white for sixth-grade boys. Allow exactly fifteen minutes. Ship the test-blanks to the undersigned as soon as possible. Cast out the papers of any child who has missed any lesson, whether of the first five or second five. Do not fail to send the papers of those who have done very poorly.

VII. SPECIFIC INSTRUCTIONS FOR EACH LESSON.

FORM B.

Lesson 1. (Monday morning.)—Give each pupil a copy of Ten Language Lessons. B. Lessons 1-5. These lessons are the same as Lessons 1-5 of Form A, except that the words used are different. The words used in the first five lessons of Form B, and which are to be studied without objects, actions, or pictures, are the fifty that were learned with objects, actions, and pictures by the pupils who used Form A. This is what we call "reversing the material."

Read the instructions for Form A and follow the same procedure. Roughly, the first class will be conducted as follows:

TEACHER: Say the words after me. Sudarium, handkerchief.

PUPILS: Sudarium, handkerchief. (The remaining words are read in the same way.)

TEACHER: It says, "Sudarium est depictum." Who can tell us what that means?

PUPILS: The handkerchief is embroidered.

TEACHER: Very good! All say the sentence. Sudarium est

depictum, The handkerchief is embroidered. (The other sentences follow. They are: The top is pointed; The ruler is straight; The barette is unfastened; The check is signed.)—The entire lesson is then repeated.

Private study, during which the teacher writes the words, in an altered order, on the board. Drill, during which the words are asked first as they occur in the lesson, then as they are on the board. Further study and drill as time permits. Collect papers; test with five words.

Lesson 2. (Monday afternoon.)—Read the words twice with the class. Repeat Lesson 1 and Lesson 2. Study; drill; written test with five words.

Lesson 3. (Tuesday morning.)—Present and repeat the lesson as you did Lesson 1. Repeat Lessons 1, 2, and 3. Study; drill; written test with five words.

Lesson 4. (Tuesday afternoon.)—Present and repeat as you did Lesson 2. Repeat Lessons 1, 2, 3, and 4. Study; drill; written test with five words.

Lesson 5. (Wednesday morning.)—Present and repeat as you did Lesson 1. Repeat all the lessons. Study; drill; written test with five words. The sentences are: The bracelet is round; The paper is ruled; The letter is addressed; The marble is smooth; The flag is unfurled.

Wednesday afternoon.—Repetition of all the lessons for fifteen minutes. For suggestions, see page 70.

Thursday morning.—Examination. Read carefully the instructions for the examination as given on page 71.

Lesson 6. (Monday morning.)—With this lesson the objective lessons begin. For suggestions, see page 71.

TEACHER (displaying a fan): This is a fan. Flabellum, fan. All repeat the word.

PUPILS: Flabellum, fan.

TEACHER: You see that the fan is open. Apertum, open. All repeat the word. . . . Here we have a rope. Funis, rope. . . . The rope is knotted. Nodatus, knotted. . . . (The remaining words are presented in the same way.) Notice the sentences. Flabellum est apertum. Who can tell us what that means?

PUPIL: The fan is open.

TEACHER: That is right. *Flabellum est apertum*, The fan is open. Repeat what I have said. (The remaining sentences are taken in the same way. They are: The rope is knotted; The bottle is corked; The nail is driven; The book is bound.)

Go through the lesson a second time, showing the objects as you do so. Study; drill, test with five words. (Teachers who begin the work with this lesson should read the instructions for Lesson 1, Form A, page 67.)

Lesson 7. (Monday afternoon.)—Before beginning the class, instruct the pupils to take out pen, paper, and blotter. In classes where only pencils are used, the teacher should tell the pupils to imagine that they are using pens and blotters. The lack of these materials will affect only the first and last words.)

TEACHER: Today we have a game that teaches us the words for some of the things we can do with our pens. All take up your pens. First we must dip them in the ink; *impono*, I dip. All repeat the word. . . . Then we shake them over the inkwells so that there may not be too much ink on them; *crepito*, I shake. All repeat the word. . . . Now I wish you (illustrating at black-board) to make four dots on your papers in the form of a square. *Interpunctuo*, I dot. . . . Next we draw the square. *Quadro*, I draw a square. . . . Then we divide it in half. *Dimidio*, I divide in half. . . . Now in half of the square I put little marks like this (illustrating). Artists often do that when they are making pictures, and to make marks that way is called "to stipple." *Adumbro*, I stipple. . . . Then we draw straight lines like this in the other half of the square. That is called hatching. *Delineo*, I hatch. . . . And finally we must blot what we have drawn; *sicco*, I blot. . . .

Go through the lesson a second time. Repeat Lessons 6 and 7. Study; drill; test with five words.

Lesson 8. (Tuesday morning.)—The lesson is presented in the same way as Lesson 6. The sentences are: The bag is full; The ball is new; The hook is curved; The doll is dressed; The glove is buttoned. Repeat the lesson; then take Lessons 6, 7, and 8, using the objects and going through the actions; study; drill; test with five words.

Lesson 9. (Tuesday afternoon.)—TEACHER: Today we have a game that teaches us many of the things we can do with our hands. Let all rise. Do the same things that I do and say the words after me. First I raise my hands. Elevo, I raise. Repeat the word. . . . (The remaining eleven words follow. The lesson is too plain to need comment.)

Go through the lesson a second time. Repeat Lessons 6, 7, 8, and 9. Study; drill; test with five words.

Note.—Always foresee what material will be necessary and avoid waste of time in getting things ready.

Lesson 10. (Wednesday morning.)—Presented as Lesson 6. The sentences are: The trap is set; The pencil is long; The package is wrapped; The stick is notched; The wire is insulated. Repeat all the lessons; study; drill; test with five words.

Note.—It is advisable after setting the trap to fasten it with a staple.

Repetition. (Wednesday afternoon.)—See the instructions for the repetition after Lesson 5, Form A, page 70.

Examination. (Thursday morning.)—See the instructions for the examination as given for Form A, page 71.

VIII. THE TESTS FOR DEFERRED RECALL.*

On the fourth Thursday after your first test, you will test the pupils again on the same words, using the blanks as you did the first time and following all the instructions as given for the first test. The one exception is that *twenty* minutes instead of fifteen is allowed. On the fifth Thursday repeat the test for the second block of words, again allowing twenty minutes.

These tests must come *absolutely without warning or preparation*.

It may be expected that the pupils, after sustaining an examination on the first five lessons they studied, will begin to speculate as to whether they will be examined on the second five. Let the teacher do all in her power to reduce to a minimum the danger of the pupils' discussing among themselves or studying in any way

* The dates set for the re-tests were changed early in the experiment. See page 58.

the words that are to occur in the second test. Let her especially avoid saying anything to indicate that there really is to be another test.

The work of correcting so many thousands of papers and tabulating the results will be so great that teachers are requested to send in all examination-papers as soon as possible, without waiting for other examinations that are to follow.

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CHAPTER V.

THE DATA AND THEIR INTERPRETATION.

We will now give frequency distributions of the scores made, arranging them in two ways: first, distributions according to form used, order followed, grade, and sex; secondly, combinations of smaller distributions into larger ones. There are two kinds of combination that appear to be both legitimate and useful. The first is the fusing of the Q's with the R's and the S's with the T's. (For an explanation of these symbols, see page 57). The second is the amalgamation of eighth-grade boys and eighth-grade girls, sixth-grade boys and sixth-grade girls.

These distributions are given in full for the sake of those to whom they may be of interest. The casual reader is referred to the summary of mean scores on page 98.

Both the median and the mean are given for two reasons. The first is that with distributions skewed as many of ours are, it might be debated whether the median or the mean gave a truer idea of the central tendency. A second reason is that while the median appears to be demanded by the prevalent custom in reporting educational experiments, the mean is of special interest because that average will be the one used in announcing the results of the word-count.

It will be observed that the conclusions drawn from the data remain substantially the same whether we work with the median or with the mean.

The rubrics at the column-heads in the following table are to be interpreted as follows:

- O-I. Test for immediate recall, objective method.
- O-D. Test for deferred recall, objective method.
- N-I. Test for immediate recall, non-objective method.
- N-D. Test for deferred recall, non-objective method.

Throughout this report the objective-method scores are always placed first, whether that method preceded or followed the non-objective when the lessons were taught.

TABLE I. GIVING FREQUENCY DISTRIBUTIONS AND MEDIAN AND MEAN SCORES FOR ALL GROUPS ACCORDING TO FORM USED, ORDER FOLLOWED, GRADE, AND SEX, WITH COMBINATIONS OF SAID GROUPS.

169 EIGHTH-GRADE BOYS FORM A, PICTURES LAST ORDER, 1-5, 6-10 (AQ)					103 EIGHTH-GRADE BOYS FORM A, PICTURES LAST ORDER, 5-1, 10-6, (AR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	40	8	22	10	40	14	29	13
45-49	50	26	40	19	19	17	20	14
40-44	19	18	30	16	10	12	13	12
35-39	14	20	21	18	9	10	13	12
30-34	18	16	15	23	10	13	9	13
25-29	11	15	11	22	9	9	10	11
20-24	13	18	12	20	4	9	6	12
15-19		18	14	18	2	11	1	7
10-14	2	17	2	15		5	2	4
5- 9	2	9	2	7		2		4
0- 4		4		1		1		
N	169	169	169	169	103	103	103	103
Md	45.6	31.1	41.3	30.3	47.0	35.8	44.0	35.2
Mn	41.0	30.1	37.9	30.3	42.3	34.4	40.6	34.1

114 EIGHTH-GRADE BOYS FORM A, PICTURES FIRST ORDER, 6-10, 1-5 (AS)					146 EIGHTH-GRADE BOYS FORM A, PICTURES FIRST ORDER, 10-6, 5-1 (AT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	29	6	20		37	8	22	10
45-49	23	17	13	5	40	26	26	16
40-49	15	20	19	11	23	29	25	11
35-39	12	15	8	3	17	18	16	9
30-34	12	15	16	11	7	27	13	15
25-29	8	12	14	21	13	11	17	18
20-24	6	10	10	18	6	12	12	14
15-19		7	7	10	2	9	6	21
10-14	7	8	6	18	1	6	4	17
5- 9	2	3	1	12			3	10
0- 4		1		5			2	5
N	114	114	114	114	146	146	146	146
Md	43.3	35.3	36.9	23.3	45.5	37.2	40.0	26.7
Mn	39.3	33.4	35.6	24.2	42.0	38.1	36.6	27.6

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272 EIGHTH-GRADE BOYS FORM A, PICTURES LAST ORDERS AQ, AR COMBINED					260 EIGHTH-GRADE BOYS FORM A, PICTURES FIRST ORDERS AS, AT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	80	22	51	23	66	14	42	10
45-49	69	43	60	33	63	43	39	21
40-44	29	30	43	28	38	49	44	22
35-39	23	30	34	30	29	33	24	12
30-34	28	29	24	36	19	42	29	26
25-29	20	24	21	33	21	23	31	39
20-24	17	27	18	33	12	22	22	32
15-19	2	29	15	25	2	16	13	31
10-14	2	22	4	19	8	14	10	35
5- 9	2	11	2	11	2	3	4	22
0- 4		5		1		1	2	10
N	272	272	272	272	260	260	260	260
Md	45.9	33.1	42.1	31.9	44.9	36.4	39.0	25.0
Mn	41.5	31.7	38.9	31.7	40.8	34.7	36.2	25.7

225 EIGHTH-GRADE BOYS FORM B, PICTURES LAST ORDER, 1-5, 6-10 (BQ)					93 EIGHTH-GRADE BOYS FORM B, PICTURES LAST ORDER, 5-1, 10-6 (BR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	40	8	35	3	27	9	23	8
45-49	38	18	42	21	18	13	25	7
40-44	29	17	24	18	9	6	14	13
35-39	27	19	29	19	10	11	6	9
30-34	36	24	33	17	11	12	8	19
25-29	22	24	25	36	7	11	4	10
20-24	17	27	19	41	4	9	6	9
15-19	10	26	10	29	2	7	2	6
10-14	5	34	5	26	4	6	3	6
5- 9	1	24	3	11	1	7	2	6
0- 4		4		4		2		
N	225	225	225	225	93	93	93	93
Md	39.0	24.5	38.0	25.2	44.2	31.9	45.3	32.5
Mn	37.5	25.8	37.4	26.7	39.7	31.0	40.3	31.6

59 EIGHTH-GRADE BOYS FORM B, PICTURES FIRST ORDER, 6-10, 1-5 (BS)					87 EIGHTH-GRADE BOYS FORM B, PICTURES FIRST ORDER, 10-6, 5-1 (BT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	18	5	24	2	21	12	18	7
45-49	26	8	19	7	20	10	22	11
40-44	4	11	5	6	20	8	13	9
35-39	6	10	3	8	8	13	12	9
30-34	4	8	5	13	6	13	8	8
25-29	1	4	3	14	5	12	6	18
20-24		8		7	4	7	3	6
15-19		1			1	10	3	13
10-14		3		2	1	1		3
5- 9		1			1	1	2	3
0- 4								
N	59	59	59	59	87	87	87	87
Md	47.8	37.3	48.6	32.5	44.4	34.8	43.7	30.3
Mn	45.6	35.5	45.3	33.5	41.5	34.6	40.3	31.8

318 EIGHTH-GRADE BOYS FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					146 EIGHTH-GRADE BOYS FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	67	17	58	11	39	17	42	9
45-49	56	31	67	28	46	18	41	18
40-44	38	23	38	31	24	19	18	15
35-39	37	30	35	28	14	23	15	17
30-34	47	36	41	36	10	21	13	21
25-29	29	35	29	46	6	16	9	32
20-24	21	36	25	50	4	15	3	13
15-19	12	33	12	35	1	11	3	13
10-14	9	40	8	32	1	4		5
5- 9	2	31	5	17	1	2	2	3
0- 4		6		4				
N	318	318	318	318	146	146	146	146
Md	40.3	26.9	40.5	27.3	46.3	35.9	46.3	31.7
Mn	38.2	27.3	37.9	28.2	43.1	34.9	42.2	32.5

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348 EIGHTH-GRADE GIRLS FORM A, PICTURES LAST ORDER, 1-5, 6-10 (AQ)					194 EIGHTH-GRADE GIRLS FORM A, PICTURES LAST ORDER, 5-1, 10-6 (AR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	121	18	89	24	86	33	88	56
45-49	84	50	91	46	63	55	50	40
40-44	39	34	52	33	12	22	20	20
35-39	28	36	48	43	15	14	20	21
30-34	26	40	28	45	5	28	4	15
25-29	20	50	17	52	9	16	4	15
20-24	14	37	14	39	1	12	5	8
15-19	7	38	6	30	2	8	2	8
10-14	7	26	3	19	1	3	1	8
5- 9	2	16		6		3		3
0- 4		3		1				
N	348	348	348	348	194	194	194	194
Md	46.8	30.5	45.3	33.0	49.1	43.0	47.1	44.8
Mn	42.2	30.7	42.0	32.6	45.6	38.9	45.2	38.2

131 EIGHTH-GRADE GIRLS FORM A, PICTURES FIRST ORDER, 6-10, 1-5 (AS)					196 EIGHTH-GRADE GIRLS FORM A, PICTURES FIRST ORDER, 10-6, 5-1 (AT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	33	5	33	3	85	21	61	8
45-49	32	14	21	4	64	53	37	26
40-44	18	24	16	11	17	29	19	33
35-39	14	21	10	10	10	25	32	10
30-34	11	11	16	12	5	21	21	20
25-29	12	26	15	8	7	18	8	21
20-24	6	10	12	22	6	15	7	21
15-19	2	15	6	19	1	8	3	19
10-14	3	3	1	25		6	6	22
5- 9		2	1	14	1		2	13
0- 4				3				3
N	131	131	131	131	196	196	196	196
Md	44.9	34.3	41.4	21.0	49.0	40.9	45.0	29.8
Mn	40.9	33.1	38.2	23.2	45.4	38.1	40.9	29.7

542 EIGHTH-GRADE GIRLS FORM A, PICTURES LAST ORDERS AQ, AR COMBINED					327 EIGHTH-GRADE GIRLS FORM A, PICTURES FIRST ORDERS AS, AT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	207	51	177	80	118	26	94	11
45-49	147	105	141	86	96	67	58	30
40-44	51	56	72	53	35	53	35	44
35-39	43	50	68	64	24	46	42	20
30-34	31	68	32	60	16	32	37	32
25-29	29	66	21	67	19	44	23	29
20-24	15	49	19	57	12	25	19	43
15-19	9	46	8	38	3	23	9	38
10-14	8	29	4	27	3	9	7	47
5- 9	2	19		9	1	2	3	27
0- 4		3		1				6
N	542	542	542	542	327	327	327	327
Md	47.8	34.3	46.7	35.9	47.6	38.1	43.4	25.4
Mn	43.4	33.6	43.2	34.8	43.5	36.1	39.9	27.1

160 EIGHTH-GRADE GIRLS FORM B, PICTURES LAST ORDER, 1-5, 6-10 (BQ)					146 EIGHTH-GRADE GIRLS FORM B, PICTURES LAST ORDER, 5-1, 10-6 (BR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	42	17	43	13	38	7	35	4
45-49	35	14	43	18	37	26	33	20
40-44	21	13	16	14	23	29	27	38
35-39	21	17	13	21	20	14	21	16
30-34	10	18	14	23	12	15	11	12
25-29	16	20	15	19	9	18	9	17
20-24	10	18	11	23	5	21	7	17
15-19	3	14	4	15	2	8	3	15
10-14	2	16	1	10		6		6
5- 9		10		3		1		1
0- 4		3		1		1		
N	160	160	160	160	146	146	146	146
Md	44.3	29.8	45.7	32.0	45.3	36.1	44.1	36.6
Mn	40.7	30.1	41.0	31.8	42.3	34.4	41.6	33.9

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74 EIGHTH-GRADE GIRLS FORM B, PICTURES FIRST ORDER, 6-10, 1-5 (BS)					127 EIGHTH-GRADE GIRLS FORM B, PICTURES FIRST ORDER, 10-6, 5-1 (BT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	23	3	30	1	36	26	39	12
45-49	21	14	11	5	30	31	33	16
40-44	9	7	9	6	17	15	20	8
35-39	6	14	9	12	22	26	10	15
30-34	5	11	6	10	9	6	13	13
25-29	5	10	1	13	10	9	4	12
20-14	3	8	4	9	2	9	4	18
15-19		4	2	8	1	3	3	20
10-14	2	1	2	4		1	1	8
5- 9		2		4		1		4
0- 4				2				1
N	74	74	74	74	127	127	127	127
Md	46.7	35.4	46.8	28.8	45.4	42.8	46.3	30.2
Mn	42.5	34.3	42.1	28.4	42.5	40.2	42.8	30.7

306 EIGHTH-GRADE GIRLS FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					201 EIGHTH-GRADE GIRLS FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	80	24	78	17	59	29	69	13
45-49	72	40	76	38	51	45	44	21
40-44	44	42	43	52	26	22	29	14
35-39	41	31	34	37	28	40	19	27
30-34	22	33	25	35	14	17	19	23
25-29	25	38	24	36	15	19	5	25
20-24	15	39	18	40	5	17	8	27
15-19	5	22	7	30	1	7	5	28
10-14	2	22	1	16	2	2	3	12
5- 9		11		4		3		8
0- 4		4		1				3
N	306	306	306	306	201	201	201	201
Md	44.9	32.6	45.0	33.7	45.9	39.4	46.4	29.5
Mn	41.4	32.0	41.3	32.8	42.5	38.1	42.5	29.9

218 SIXTH-GRADE BOYS FORM A, PICTURES LAST ORDER, 1-5, 6-10 (AQ)					36 SIXTH-GRADE BOYS FORM A, PICTURES LAST ORDER, 5-1, 10-6 (AR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	30	5	19	5	2			1
45-49	23	12	37	9	2	1	4	3
40-44	29	8	29	12	7	1	3	2
35-39	18	14	29	17	7	3	6	3
30-34	28	12	29	36	8	2	9	2
25-29	21	31	25	33	4	8	6	1
20-24	23	40	25	30	3	6	3	5
15-19	21	28	14	37		5	1	7
10-14	14	30	9	19	2	3	2	6
5- 9	8	28	2	13		5	1	5
0- 4	3	10		7	1	2		2
N	218	218	218	218	36	36	36	36
Md	33.4	21.6	35.9	25.5	35.0	22.5	32.8	18.6
Mn	32.6	22.6	34.8	25.6	33.9	21.9	32.1	22.2

58 SIXTH-GRADE BOYS FORM A, PICTURES FIRST ORDER, 6-10, 1-5 (AS)					127 SIXTH-GRADE BOYS FORM A, PICTURES FIRST ORDER, 10-6, 5-1 (AT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	18		10	2	22	6	13	5
45-49	20	15	15	13	16	9	14	6
40-44	8	14	10	10	5	7	11	3
35-39	5	8	6	5	14	10	12	8
30-34	1	7	6	6	24	11	17	12
25-29	1	5	5	5	16	28	23	5
20-24	2	3	2	7	16	18	17	12
15-19	2	1	1	2	6	18	9	29
10-14	1	2	2	4	6	14	8	29
5- 9		3	1	1	2	4	3	7
0- 4				3		2		11
N	58	58	58	58	127	127	127	127
Md	47.3	40.0	43.0	36.0	33.6	26.3	31.0	17.8
Mn	44.0	36.3	39.5	33.1	34.4	27.2	32.1	21.4

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254 SIXTH-GRADE BOYS FORM A, PICTURES LAST ORDERS AQ, AR COMBINED					185 SIXTH-GRADE BOYS FORM A, PICTURES FIRST ORDERS AS, AT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	32	5	20	5	40	6	23	7
45-49	25	13	41	12	36	24	29	19
40-44	36	9	32	14	13	21	21	13
35-39	25	17	35	20	19	18	18	13
30-34	36	14	38	38	25	18	23	18
25-29	25	39	31	34	17	33	28	10
20-24	26	46	28	35	18	21	19	19
15-19	21	33	15	44	8	19	10	31
10-14	16	33	11	25	7	16	10	33
5- 9	8	33	3	18	2	7	4	8
0- 4	4	12		9		2		14
N	254	254	254	254	185	185	185	185
Md	33.8	21.7	35.1	24.4	39.1	29.2	34.7	21.7
Mn	32.8	22.5	34.5	25.0	37.3	30.1	34.4	25.0

354 SIXTH-GRADE BOYS FORM B, PICTURES LAST ORDER, 1-5, 6-10 (BQ)					91 SIXTH-GRADE BOYS FORM B, PICTURES LAST ORDER, 5-1, 10-6 (BR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	55	11	38	6	5		4	
45-49	67	35	56	33	7	3	10	2
40-44	47	34	37	31	5	8	10	9
35-39	36	39	46	35	7	4	11	6
30-34	31	34	51	45	13	7	8	9
25-29	26	56	46	48	10	7	11	9
20-24	29	31	28	55	18	13	12	16
15-19	19	36	23	35	9	15	15	17
10-14	27	27	19	33	8	16	4	15
5- 9	16	36	8	26	7	12	6	4
0- 4	1	15	2	7	2	6		4
N	354	354	354	354	91	91	91	91
Md	38.9	27.9	35.0	27.2	25.8	18.8	28.9	21.7
Mn	35.2	27.5	34.2	27.5	27.2	21.0	29.7	23.4

153 SIXTH-GRADE BOYS FORM B, PICTURES FIRST ORDER, 6-10, 1-5 (BS)					85 SIXTH-GRADE BOYS FORM B, PICTURES FIRST ORDER, 10-6, 5-1 (BT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	6	1	12	2	5		1	
45-49	16	6	15	5	12	9	8	
40-44	11	6	12	8	9	16	11	1
35-39	22	11	25	11	18	1	11	11
30-34	38	14	10	9	7	8	15	16
25-29	18	28	16	17	12	11	13	8
20-24	22	27	20	19	10	13	9	11
15-49	16	34	16	23	4	9	11	17
10-14	3	21	22	24	4	12	4	14
5- 9	1	4	4	22	2	4	1	4
0- 4		1	1	13	2	2	1	3
N	153	153	153	153	85	85	85	85
Md	32.2	23.1	29.2	19.2	35.4	26.1	31.2	22.0
Mn	32.0	24.3	29.8	20.8	32.9	27.6	30.7	23.0

445 SIXTH-GRADE BOYS FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					238 SIXTH-GRADE BOYS FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	60	11	42	6	11	1	13	2
45-49	74	38	66	35	28	15	23	5
40-44	52	42	47	40	20	22	23	9
35-39	43	43	57	41	40	12	36	22
30-34	44	41	59	54	45	22	25	25
25-29	36	63	57	57	30	39	29	25
20-24	47	44	40	71	32	40	29	30
15-19	28	51	38	52	20	43	27	40
10-14	35	43	23	48	7	33	26	38
5- 9	23	48	14	30	3	8	5	26
0- 4	3	21	2	11	2	3	2	16
N	445	445	445	445	238	238	238	238
Md	35.8	26.2	34.1	25.9	32.8	24.0	30.2	19.9
Mn	33.5	26.2	33.3	26.7	32.4	25.5	30.1	21.5

OBJECTIVE METHODS IN LATIN

338 SIXTH-GRADE GIRLS FORM A, PICTURES LAST ORDER, 1-5, 6-10 (AQ)					142 SIXTH-GRADE GIRLS FORM A, PICTURES LAST ORDER, 5-1, 10-6 (AR)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	76	4	49	8	13	3	16	5
45-49	52	18	61	15	20	8	18	14
40-44	51	24	49	20	20	7	21	19
35-39	35	33	51	41	18	11	25	17
30-34	27	45	38	61	19	11	16	23
25-29	45	51	42	59	17	23	17	20
20-24	19	58	22	55	15	24	11	21
15-19	16	47	13	43	12	24	12	9
10-14	8	39	11	22	5	21	4	5
5-9	8	14	2	12	2	8	2	9
0-4	1	5		2	1	2		
N	338	338	338	338	142	142	142	142
Md	41.0	25.6	39.0	28.0	35.0	23.3	36.8	31.5
Mn	37.7	26.4	37.3	28.0	34.1	24.8	35.2	31.1

75 SIXTH-GRADE GIRLS FORM A, PICTURES FIRST ORDER, 6-10, 1-5 (AS)					144 SIXTH-GRADE GIRLS FORM A, PICTURES FIRST ORDER, 10-6, 5-1 (AT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	29	3	14	1	37	9	28	17
45-49	18	23	19	20	21	22	18	16
40-44	7	9	10	8	17	12	9	2
35-39	11	13	11	8	20	8	16	3
30-34	3	6	7	7	12	19	22	10
25-29	3	2	5	4	9	15	22	15
20-24	2	11	5	8	9	16	10	17
15-19	2	5	3	11	9	15	3	23
10-14		3	1	5	6	13	5	22
5-9				3	3	9	10	11
0-4					1	6	1	8
N	75	75	75	75	144	144	144	144
Md	47.6	39.0	42.8	34.6	40.9	29.3	34.8	22.4
Mn	43.7	36.5	39.8	32.5	37.6	29.2	34.5	25.8

480 SIXTH-GRADE GIRLS
 FORM A, PICTURES LAST
 ORDERS AQ, AR COMBINED

 219 SIXTH-GRADE GIRLS
 FORM A, PICTURES FIRST
 ORDERS AS, AT COMBINED

Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	89	7	65	13	66	12	42	18
45-49	72	26	79	29	39	45	37	36
40-44	71	31	70	39	24	21	19	10
35-39	53	44	76	58	31	21	27	11
30-34	46	56	54	84	15	25	29	17
25-29	62	74	59	79	12	17	27	19
20-24	34	82	33	76	11	27	15	25
15-19	28	71	25	52	11	20	6	34
10-14	13	60	15	27	6	16	6	27
5- 9	10	22	4	21	3	9	10	14
0- 4	2	7		2	1	6	1	8
N	480	480	480	480	219	219	219	219
Md	39.2	24.9	38.3	28.9	44.1	32.9	37.9	25.4
Mn	36.6	25.9	36.9	28.9	39.7	31.7	36.4	28.1

 199 SIXTH-GRADE GIRLS
 FORM B, PICTURES LAST
 ORDER, 1-5, 6-10 (BQ)

 163 SIXTH-GRADE GIRLS
 FORM B, PICTURES LAST
 ORDER, 5-1, 10-6 (BR)

Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	38	5	33	8	22	8	22	8
45-49	35	18	36	16	15	18	27	20
40-44	33	16	27	19	20	11	20	16
35-39	22	19	25	18	17	15	20	15
30-34	16	24	23	30	27	13	21	22
25-29	18	23	15	22	22	20	17	20
20-24	8	24	19	22	16	26	16	17
15-19	15	30	11	24	7	17	13	22
10-14	7	18	7	25	11	11	3	12
5- 9	6	15	2	11	6	16	4	8
0- 4	1	7	1	4		8		3
N	199	199	199	199	163	163	163	163
Md	41.0	26.2	39.3	28.1	33.6	25.9	36.9	29.9
Mn	37.1	26.8	36.8	27.5	31.9	27.1	35.4	29.7

OBJECTIVE METHODS IN LATIN

219 SIXTH-GRADE GIRLS FORM B, PICTURES FIRST ORDER, 6-10, 1-5 (BS)					70 SIXTH-GRADE GIRLS FORM B, PICTURES FIRST ORDER, 10-6, 5-1 (BT)			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	12	4	20		11	3	4	1
45-49	33	17	29	7	14	2	14	3
40-44	20	16	16	8	15	3	9	3
35-39	44	17	22	10	3	7	6	
30-34	24	28	25	17	5	14	7	10
25-29	31	36	23	22	4	8	5	10
20-24	25	36	27	31	8	15	6	11
15-19	18	34	24	42	6	7	8	6
10-14	7	19	19	44	3	7	8	11
5- 9	5	9	12	21	1	3	3	15
0- 4		3	2	17		1		
N	219	219	219	219	70	70	70	70
Md	34.9	26.2	30.5	18.3	40.7	26.3	33.6	21.4
Mn	33.3	27.1	30.5	20.0	36.7	26.9	31.9	21.7

362 SIXTH-GRADE GIRLS FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					289 SIXTH-GRADE GIRLS FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	60	13	55	16	23	7	24	1
45-99	50	36	63	36	47	19	43	10
40-44	53	27	47	35	35	19	25	11
35-39	39	34	45	33	47	24	28	10
30-34	43	37	44	52	29	42	32	27
25-29	40	43	32	42	35	44	28	32
20-24	24	50	35	39	33	51	33	42
15-19	22	47	24	46	24	41	32	48
10-14	18	29	10	37	10	26	27	55
5- 9	12	31	6	19	6	12	15	36
0- 4	1	15	1	7		4	2	17
N	362	362	362	362	289	289	289	289
Md	37.7	26.0	38.2	28.9	35.8	26.2	31.2	18.8
Mn	35.4	26.8	36.2	28.7	34.3	27.1	30.9	20.4

814 BOYS & GIRLS (8TH) FORM A, PICTURES LAST ORDERS AQ, AR COMBINED					587 BOYS & GIRLS (8TH) FORM A, PICTURES FIRST ORDERS AS, AT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	287	73	228	103	184	40	136	21
45-49	216	148	201	119	159	110	97	51
40-44	80	86	115	81	73	102	79	66
35-39	66	80	102	94	53	79	66	32
30-34	59	97	56	96	35	74	66	58
25-29	49	90	42	100	40	67	54	68
20-24	32	76	37	90	24	47	41	75
15-19	11	75	23	63	5	39	22	69
10-14	10	51	8	46	11	23	17	82
5- 9	4	30	2	20	3	5	7	49
0- 4		8		2		1	2	16
N	814	814	814	814	587	587	587	587
Md	47.2	34.0	45.5	34.5	46.5	37.4	41.2	25.2
Mn	42.8	31.8	41.8	33.2	42.4	35.5	38.2	26.5

624 BOYS & GIRLS (8TH) FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					347 BOYS & GIRLS (8TH) FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	147	41	136	28	98	46	111	22
45-49	128	71	143	66	97	63	85	39
40-44	82	65	81	83	50	41	47	29
35-39	78	61	69	65	42	63	34	44
30-34	69	69	66	71	24	38	32	44
25-29	54	73	53	82	21	35	14	57
20-24	36	75	43	90	9	32	11	40
15-19	17	55	19	65	2	18	8	41
10-14	11	62	9	48	3	6	3	17
5- 9	2	42	5	21	1	5	2	11
0- 4		10		5				3
N	624	624	624	624	347	347	347	347
Md	42.7	29.5	43.0	30.0	46.1	38.1	46.3	30.5
Mn	39.8	29.6	39.5	30.4	42.8	36.7	42.4	31.0

734 BOYS & GIRLS (6TH) FORM A, PICTURES LAST ORDERS AQ, AR COMBINED					404 BOYS & GIRLS (6TH) FORM A, PICTURES FIRST ORDERS AS, AT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	121	12	85	18	106	18	65	25
45-49	97	39	120	41	75	69	66	55
40-44	107	40	102	53	37	42	40	23
35-39	78	61	111	78	50	39	45	24
30-34	82	70	92	122	40	43	52	35
25-29	87	113	90	113	29	50	55	29
20-24	60	128	61	111	29	48	34	44
15-19	49	104	40	96	19	39	16	65
10-14	29	93	26	52	13	32	16	60
5- 9	18	55	7	39	5	16	14	22
0- 4	6	19		11	1	8	1	22
N	734	734	734	734	404	404	404	404
Md	37.3	23.8	37.3	27.6	42.2	31.0	36.6	23.8
Mn	35.3	24.7	35.9	27.6	38.6	30.9	35.5	26.7

807 BOYS & GIRLS (6TH) FORM B, PICTURES LAST ORDERS BQ, BR COMBINED					527 BOYS & GIRLS (6TH) FORM B, PICTURES FIRST ORDERS BS, BT COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	120	24	97	22	34	8	37	3
45-49	124	74	129	71	75	34	66	15
40-44	105	69	94	75	55	41	48	20
35-39	82	77	102	74	87	36	64	32
30-34	87	78	103	106	74	64	57	52
25-29	76	106	89	99	65	83	57	57
20-24	71	94	75	110	65	91	62	72
15-19	50	98	62	98	44	84	59	88
10-14	53	72	33	85	17	59	53	93
5- 9	35	79	20	49	9	20	20	62
0- 4	4	36	3	18	2	7	4	33
N	807	807	807	807	527	527	527	527
Md	36.7	26.2	35.9	27.2	34.1	25.0	30.7	19.3
Mn	36.3	26.5	34.6	27.6	33.3	26.4	30.5	21.0

1,548 SUBJECTS, BOTH GRADES
FORM A, PICTURES LAST
ORDERS AQ, AR COMBINED

991 SUBJECTS, BOTH GRADES
FORM A, PICTURES FIRST
ORDERS AS, AT COMBINED

Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	408	85	313	121	290	58	201	46
45-49	313	187	321	160	234	179	163	106
40-44	187	126	217	134	110	144	119	89
35-39	144	141	213	172	103	118	111	56
30-34	141	167	148	218	75	117	118	93
25-29	136	203	132	213	69	117	109	97
20-24	92	204	98	201	53	95	75	119
15-19	60	179	63	159	24	78	38	134
10-14	39	144	34	98	24	55	33	142
5- 9	22	85	9	59	8	21	21	71
0- 4	6	27		13	1	9	3	38
N	1,548	1,548	1,548	1,548	991	991	991	991
Md	43.6	28.3	41.8	30.7	45.6	35.1	39.4	24.6
Mn	39.8	29.1	39.0	30.8	40.8	33.6	37.3	26.6

1,431 SUBJECTS, BOTH GRADES
FORM B, PICTURES LAST
ORDERS BQ, BR COMBINED

874 SUBJECTS, BOTH GRADES
FORM B, PICTURES FIRST
ORDERS BS, BT COMBINED

Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	267	65	233	50	132	54	148	25
45-49	252	145	272	137	172	97	151	54
40-44	187	134	175	158	105	82	95	49
35-39	160	138	171	139	129	99	98	76
30-34	156	147	169	177	98	102	89	96
25-29	130	179	142	181	86	118	71	114
20-24	107	169	118	200	74	123	73	112
15-19	67	153	81	163	46	102	67	129
10-14	64	134	42	133	20	65	56	110
5- 9	37	121	25	70	10	25	22	73
0- 4	4	46	3	23	2	7	4	36
N	1,431	1,431	1,431	1,431	874	874	874	874
Md	39.7	27.6	39.0	28.5	38.9	29.9	37.8	24.0
Mn	36.8	27.9	36.8	29.5	37.0	30.5	35.3	25.2

ALL SUBJECTS TAKING PICTURES LAST FORMS A AND B					ALL PICTURES TAKING PICTURES FIRST FORMS A AND B			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	675	150	546	171	422	112	349	71
45-49	565	332	593	297	406	276	314	160
40-44	374	260	392	292	215	226	214	138
35-39	304	279	384	311	232	217	209	132
30-34	297	314	317	395	173	219	207	189
25-29	266	382	274	394	155	235	180	211
20-24	199	373	216	401	127	218	148	231
15-19	127	332	144	322	70	180	105	263
10-14	103	278	76	231	44	120	89	252
5- 9	59	206	34	129	18	46	43	144
0- 4	10	73	3	36	3	16	7	74
N	2,979	2,979	2,979	2,979	1,865	1,865	1,865	1,865
Md	41.7	28.0	40.5	29.7	42.6	32.7	38.7	24.3
Mn	38.0	28.5	37.9	29.9	39.1	32.2	36.2	25.8

ALL SUBJECTS USING FORM A ALL ORDERS COMBINED					ALL SUBJECTS USING FORM B ALL ORDERS COMBINED			
Interval	O-I	O-D	N-I	N-D	O-I	O-D	N-I	N-D
50	698	143	514	167	399	119	381	75
45-49	547	366	484	266	424	242	423	191
40-44	297	270	336	223	292	216	270	207
35-39	247	259	324	228	289	237	269	215
30-34	216	284	266	311	254	249	258	273
25-29	205	320	241	310	216	297	213	295
20-24	145	299	173	320	181	292	191	312
15-19	84	257	101	293	113	255	148	292
10-14	63	199	67	240	84	199	98	243
5- 9	30	106	30	130	47	146	47	143
0- 4	7	36	3	51	6	53	7	59
N	2,539	2,539	2,539	2,539	2,305	2,305	2,305	2,305
Md	41.2	30.9	41.0	28.8	39.4	28.5	38.5	26.8
Mn	39.9	30.9	38.3	29.2	36.9	28.9	36.2	27.4

4,844 PUPILS, BOTH GRADES AND SEXES. BOTH FORMS AND ALL
ORDERS COMBINED.

Interval	OBJECTIVE METHOD		NON-OBJECTIVE METHOD	
	First Test	Re-Test	First Test	Re-Test
50	1,097	262	895	242
45-49	971	608	907	457
40-44	589	486	606	430
35-39	536	496	593	443
30-34	470	533	524	584
25-29	421	617	454	605
20-24	326	591	364	632
15-19	197	512	249	585
10-14	147	398	165	483
5-9	77	252	77	273
0	13	89	10	110
N	4,844	4,844	4,844	4,844
Md	42.0	29.7	39.9	27.8
Mn	39.4	29.9	36.2	28.4

TABLE II. SUMMARY OF MEAN SCORES ACCORDING TO FORM USED,
ORDER OF LESSONS, GRADE AND SEX.

		MEAN SCORES						
Form Used and Order Followed		Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls	All Eighth Grade	All Sixth Grade	All Sub ject
A Q:	O-I	41.0	42.2	32.6	37.7	....	....	....
	O-D	30.1	30.7	22.6	26.4	....	....	....
	N-I	37.9	42.0	34.8	37.3	....	....	....
	N-D	30.3	32.6	25.6	28.0	....	....	....
B Q:	O-I	37.5	40.7	35.2	37.1	....	....	....
	O-D	25.8	30.1	27.5	26.8	....	....	....
	N-I	37.4	41.0	34.2	36.8	....	....	....
	N-D	26.7	31.8	27.5	27.5	....	....	....
A R:	O-I	42.3	45.6	33.9	34.1	....	....	....
	O-D	34.4	38.9	21.9	24.8	....	....	....
	N-I	40.6	45.2	32.1	35.2	....	....	....
	N-D	34.1	38.2	22.2	31.1	....	....	....
BR:	O-I	39.7	42.3	27.2	31.9	....	....	....
	O-D	31.0	34.4	21.0	27.1	....	....	....
	N-I	40.3	41.6	29.7	35.4	....	....	....
	N-D	31.6	33.9	23.4	29.7	....	....	....
A S:	O-I	39.3	40.9	44.0	43.7	....	....	....
	O-D	33.4	33.1	36.3	36.5	....	....	....
	N-I	35.6	38.2	39.5	39.8	....	....	....
	N-D	24.2	23.2	33.1	32.5	....	....	....
B S:	O-I	45.6	42.5	32.0	33.3	....	....	....
	O-D	35.5	34.3	24.3	27.1	....	....	....
	N-I	45.3	42.1	29.8	30.5	....	....	....
	N-D	33.5	28.4	20.8	20.0	....	....	....
A T:	O-I	42.0	45.4	34.4	37.6	....	....	....
	O-D	38.1	38.1	27.2	29.2	....	....	....
	N-I	36.6	40.9	32.1	34.5	....	....	....
	N-D	27.6	29.7	21.4	25.8	....	....	....
B T:	O-I	41.5	42.5	32.9	36.7	....	....	....
	O-D	34.6	40.2	27.6	26.9	....	....	....
	N-I	40.3	42.8	30.7	31.9	....	....	....
	N-D	31.8	30.7	23.0	21.7	....	....	....

MEAN SCORES								
Form Used and Order Followed		Eighth-Grade Boys	Eighth-Grade Girls	Sixth-Grade Boys	Sixth-Grade Girls	All Eighth Grade	All Sixth Grade	All Subjects
A Q & A R:	O-I	41.5	43.4	32.8	36.6	42.8	35.3	39.8
	O-D	31.7	33.6	22.5	25.9	31.8	24.7	29.1
	N-I	38.9	43.2	34.5	36.9	41.8	35.9	39.0
	N-D	31.7	34.8	25.0	28.9	33.2	27.6	30.8
B Q & B R:	O-I	38.2	41.4	33.5	35.4	39.8	36.3	36.8
	O-D	27.3	32.0	26.2	26.8	29.6	26.5	27.9
	N-I	37.9	41.3	33.3	36.2	39.5	34.6	36.8
	N-D	28.2	32.8	26.7	28.7	30.4	27.6	29.5
A S & A T:	O-I	40.8	43.5	37.3	39.7	42.4	38.6	40.8
	O-D	34.7	36.1	30.1	31.7	35.5	30.9	33.6
	N-I	36.2	39.9	34.4	36.4	38.2	35.5	37.3
	N-D	25.7	27.1	25.0	28.1	26.5	26.7	26.6
B S & B T:	O-I	43.1	42.5	32.4	34.3	42.8	33.3	37.0
	O-D	34.9	38.1	25.5	27.1	36.7	26.4	30.5
	N-I	42.2	42.5	30.1	30.9	42.4	30.5	35.3
	N-D	32.5	29.9	21.5	20.4	31.0	21.0	25.2
A Q, A R, A S, & A T:	O-I	41.2	43.5	34.7	37.6	42.6	36.1	39.9
	O-D	33.2	34.6	25.7	27.7	34.2	26.9	30.9
	N-I	38.5	41.9	34.5	36.6	39.9	35.8	38.3
	N-D	28.7	31.9	25.7	28.8	30.7	27.3	29.2
B Q, B R, B S, & B T:	O-I	39.7	41.9	33.1	34.9	40.9	34.0	36.9
	O-D	29.7	34.4	25.9	27.8	32.2	26.5	28.9
	N-I	39.3	41.8	32.2	33.9	40.6	33.0	36.2
	N-D	29.5	31.6	24.9	25.5	30.6	25.0	27.4
A Q, A R, B Q & B R:	O-I	39.0	42.7	33.3	36.1	41.5	34.8	38.0
	O-D	29.4	33.1	24.8	26.3	31.7	25.7	28.5
	N-I	38.4	42.5	33.7	36.5	40.5	35.2	37.9
	N-D	29.8	34.1	26.1	28.8	32.3	27.6	29.9
A S, A T, B S & B T:	O-I	41.6	43.3	34.6	36.5	42.5	35.6	39.1
	O-D	34.7	36.8	27.5	29.1	36.5	28.3	32.2
	N-I	38.4	40.9	32.0	33.3	39.8	32.7	36.2
	N-D	28.2	28.2	23.1	23.7	28.2	23.5	25.8
A Q, A R, A S, A T, B Q, B R, B S, & B T:	O-I	40.5	42.9	33.7	36.3	41.9	35.1	39.4
	O-D	30.6	34.1	25.8	27.0	33.2	26.6	29.9
	N-I	38.4	42.4	33.1	35.3	40.4	34.3	36.2
	N-D	29.1	31.5	24.9	26.9	30.7	26.0	28.4

INTERPRETATION OF THE DATA.

The foregoing data were given in such detail in order to afford others the fullest possible opportunity of testing the validity of the writer's conclusions. It is easier to sin by defect than by excess when describing exactly what happened in an educational experiment. But it is now our task to comment on some of the outstanding facts of greater importance.

Fact I. The subjects involved in the experiment constitute a fair random sampling of the school population.

The first fact is that we are apparently dealing here with a group that may properly be considered a fair random sampling of the school population. We have presented complete scores—that is, scores in all four of the tests—from 4,844 subjects. These subjects were found in schools widely separated geographically. There were included public schools and parochial schools, urban and rural schools, schools with a large registration and schools with a small registration. No effort was made to select either the better or the poorer schools, and it was clearly indicated by the results attained that we actually did have schools in which the general standard of attainment varied to a large extent.

Statistically, the number of subjects secured appears to be satisfactory. The value of σ , as derived from the test for deferred recall for the words learned objectively by all the subjects (4,844) when thrown into one frequency distribution, is 14.95. Applying to this the formula

$$\text{S. D. mean} = \frac{\text{S. D. distribution}}{\sqrt{N}}$$

we find that the probable error of the mean is ± 0.21 . The same formulae, applied to the test for immediate recall for the words learned objectively by all subjects (991) who used Form A, give us a probable error for the mean of ± 0.17 .

It is therefore evident that we are somewhat close to the true average. But the writer said advisedly that we have, not a *perfect*, but a *fair* random sampling of the school population. Two facts conspire to make him temperate in his claims.

The first is the general consideration that, as Rugg declares, statistical methods can prove deceptive if divorced from common-sense and permitted to function without dependence upon the results of practical experience.

A group may appear, statistically, to be representative, yet we may have failed to include in it elements that would materially change the results.

The writer had proof of this in his experiments of 1921-22. Working in schools where the pupils were predominantly of American extraction, he secured averages that ranged from 60 up to 75 per cent. He then found himself, very much by accident, in parochial schools where the pupils were almost exclusively Polish. For months he did not even know that these schools existed. The lowest average returned by any one of five classes of these Polish children was 93 per cent, or almost twenty points higher than any average previously secured.

Three reasons might be alleged for this superior showing. First, bilingual children are probably at an advantage when there is question of learning a foreign vocabulary. Secondly, in the schools in question constant insistence was put upon memoriter work. Thirdly, the schools were too small to receive all applicants, and the administrative department was consequently free to exclude or eliminate undesirable pupils.

But whatever the cause, it is a fact that a number of schools with power to make radical changes in a mean score existed in the city *unknown to the experimenter*. Ignorance, of course; yet the blunder of working with select groups is one that occurs quite frequently.

One's probable error may prove fallacious unless thorough exploration of the field has prevented him from omitting anomalous groups such as the one just described. If there were schools in heaven, most if not all of the averages applicable to children on

earth would fail to fit them. So, likewise, groups of superior, inferior, or exceptional children may exist in any school population. We must neither deal exclusively with them, nor omit them.

The writer feels that the number of subjects should have been much greater in order to insure a perfect random sampling.

The second fact that warns the writer to be cautious is the following. There were in his experiment many pupils whose scores were rejected because, after being present for the first week's work, they missed a lesson during the second week. Now absence during the second week had no effect on the work of the first week, and consequently it was entirely legitimate to make use of the scores for the first week. The writer added these scores to the frequency distributions for *all* pupils using Form A or Form B, as the case might be, and following Orders Q and R or S and T. This gave four divisions with four scores in each; those, namely, for the tests for immediate recall and for deferred recall for the words seen objectively and for those seen non-objectively. The number of scores added to any distribution varied from 200 up to 900. In fifteen out of sixteen cases no appreciable difference in the average resulted; but in the test for immediate recall for the words learned non-objectively by the AQ-and-AR-group, the difference was -1.2. It was to this group that the greatest number of new scores was added.

The writer has stated these facts frankly in order not to make his data appear more conclusive than they are. But it must be remembered that a change of one point in one of sixteen tests, especially when less than a fourth of all the subjects was involved, is not in itself a matter of very serious moment.

Fact II. Form A, both in its objective and its non-objective part, is easier to learn than Form B.

The 2,539 subjects using Form A learned the *sudarium*-block of words objectively. For these words they scored 39.9 in the test for immediate recall, and 30.9 in the test for deferred recall.

The 2,305 pupils using Form B learned the *flabellum*-block of words objectively. For these words they scored 36.9 in the test for immediate recall, and 28.9 in the test for deferred recall.

Comparing the words learned non-objectively, we find that the Form-A pupils scored 38.3 and 29.2, while the Form-B pupils scored 36.2 and 27.4. The scores are therefore as follows:

	O-I	O-D	N-I	N-D
Form A	39.9	30.9	38.3	29.2
Form B	36.9	28.9	36.2	27.4

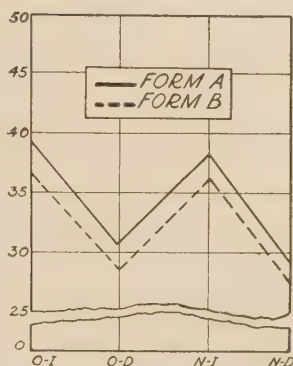


Fig. 3. Showing the Comparative Difficulty of the *Sudarium*- and *Flabellum*-Blocks.

We may next inquire whether this condition is general, or whether the superiority of the Form-A group is due to a few isolated instances where the scores were very much higher. Turning to the summary of the mean scores (page 98), and examining the thirty cases where a comparison is possible (as, for example, between eighth-grade boys using Form A, Order Q, and eighth-grade boys using Form B, Order Q; all sixth-grade pupils using Form A, Orders S and T, and all sixth-grade pupils using Form B, Orders S and T, etc.), we find in the test for immediate recall that in thirty of thirty-seven instances the objective portion of Form A was learned better than the objective portion of Form B; and that in twenty-seven of thirty-seven instances the non-objective portion of Form A was learned better than the non-objective portion of Form B.

Two explanations of this fact are possible. One is that the Form-A subjects are a superior group. The other is that some words profit by objective presentation while others suffer from it, and that Form A contained the better distribution of words.

Proof that the second alternative is the correct one will be given in the following chapter.

Fact III. The work of the second week was inferior to that of the first week. There was no improvement due to practice, but rather a decrease in learning-efficiency.

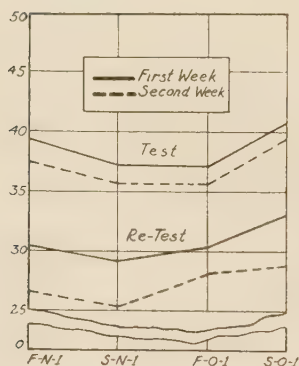


Fig. 4. The First and Second Weeks Compared.

Symbols: F=Flabellum-Block; S=Sudarium-Block; 1=Seen the First Week; 2=Seen the Second Week; O=Objectively; N=Non-Objectively.

In the beginning of his work the writer anticipated that some allowance would have to be made for the effect of practice. The work was new for grade-school pupils and it seemed probable that after learning fifty words during the first week, they would display an increase of learning-efficiency during the second week.

The fact is, however, that there was a decrease in efficiency. This is clearly brought out by the scores. As to the causes of this phenomenon, the writer has the following suggestions to offer.

In the first place, to learn that *acus* is a *needle* is very much the same as learning that *matrimony* is a *sacrament* or that a *gargoyle* is an *architectural ornament*; and this is a type of work that occupies a large portion of the time of grade-school pupils. Hence a few short lessons did not and could not produce an appreciable improvement.

In the second place, the work which began as a new and interesting adventure was given a different character by the examination that came at the end of the first week. The large examination-blanks, with the words arranged in alphabetical order,

made the pupils feel that the work was not wholly a game. The writer was informed by some teachers that the pupils considered the examination "very hard." It was hard both because of the way in which the words were arranged and because of the time-limit imposed. One might argue that the examination should have served as a warning, and spurred the pupils on to additional efforts during the second week. This is a theory, however, that does not accord with the facts of child-nature.

The loss of interest during the second week was particularly noticeable when objective methods were used the first week. But when objective methods were not used till the second week, their introduction served as a stimulus to re-awaken the interest of the pupils.

The data justifying our assertion concerning the loss of efficiency are as follows:

	First Test	Re-Test
<i>Flabellum</i> -block seen the first week non-objectively (AQ, AR).....	39.0	30.8
<i>Flabellum</i> -block seen the second week non-objectively (AS, AT).....	37.3	26.6
<i>Sudarium</i> -block seen the first week non-objectively (BQ, BR).....	36.8	29.5
<i>Sudarium</i> -block seen the second week non-objectively (BS, BT).....	35.3	25.2
<i>Flabellum</i> -block seen the first week objectively (BS, BT).....	37.0	30.5
<i>Flabellum</i> -block seen the second week objectively (BQ, BR).....	36.8	27.9
<i>Sudarium</i> -block seen the first week objectively (AS, AT).....	40.8	33.6
<i>Sudarium</i> -block seen the second week objectively (AQ, AR).....	39.8	29.1

From these data it is evident that there is no instance in which the same block of words, taught by the same method, was learned as well the second week as it was the first week. If it is objected that the words were learned during the first week by one group,

and during the second week by another group, and that consequently we may be dealing with certain superior groups, the answer is that the very subjects who showed their superiority when their first week's work was compared with the second week's work of others, are in turn defeated when there is question of their second week's work.

A most important corollary to this truth is the fact that we can scarcely institute comparisons between the scores made by subjects the first week with the scores of the same subjects for the second week. To endeavor to determine the precise allowance to be made for the effects of practice (in this case, negative) would be a matter of extreme delicacy. We shall make such comparisons in order to omit nothing that might shed light on our question; but a more dependable basis of comparison is the work done during the first week by different subjects under different conditions.

Fact IV. From an indirect comparison of one group with another group, it appears that one block of words is learned better objectively; the other, non-objectively.

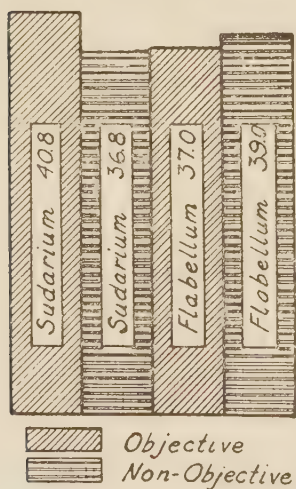


Fig. 5. Objective and Non-Objective Presentation Compared.

We are here disregarding the work of the second week, and comparing what certain subjects accomplished during the first week with the work of other subjects during the same week. In the case of some subjects the *flabellum*-block was taught objectively the first week, while other subjects learned the same words non-objectively during the first week. The same thing is true of the *sudarium*-block. By disregarding, for the time at least, the work of the second week, we avoid the necessity of making allowance for the alterations of attitude which we have seen were caused by the first week's work.

The data derived from the comparison just described are as follows:

	First Test	Re-Test
All subjects (1,548) learning the <i>flabellum</i> -block		
the first week non-objectively made.....	39.0	30.8
All subjects (874) learning the <i>flabellum</i> -block		
the first week objectively made.....	37.0	30.5
All subjects (1,431) learning the <i>sudarium</i> -block		
the first week non-objectively made.....	36.8	29.5
All subjects (991) learning the <i>sudarium</i> -block		
the first week objectively made.....	40.8	33.6

From this it is evident that the *flabellum*-block is learned better objectively; the *sudarium*-block, non-objectively. The improvement due to the use of objective methods when they are suitable amounts to 8 per cent; the injury done by using objective methods when unsuitable amounts to 4 per cent.

Fact V. From a direct comparison between the work of subjects the first week with the work of the same subjects the second week, it appears in general that objective methods assist learning but make for less perfect retention.

We are now comparing what subjects accomplished the first week with what the same subjects did the second week. It is important to remember that there is always a decrease in learning-efficiency the second week. While this decrease must be attributed, at least in some degree, to the method used, it should be noted that the inferior results are not due to the method as such, but to the method *as placed in juxtaposition to, or as following after, another method.*

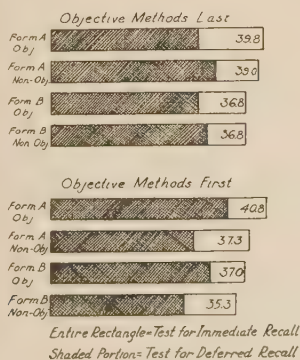


Fig. 6. Showing the Work of Subjects when Compared with Themselves.

We find that when non-objective methods were used the first week, the

scores in the test for immediate recall were almost identical for the objectively- and the non-objectively-learned words, but that the non-objectively-learned words were retained better after the lapse of a month. This is true for both Form A and Form B.

	O-I	O-D	N-I	N-D
Subjects (1,548) using Form A and taking non-objective methods first..	39.8	29.1	39.0	30.8
Subjects (1,431) using Form B and taking non-objective methods first..	36.8	27.9	36.8	29.5
But when objective methods were used the first week, they proved universally and decisively superior in every test.				
Subjects (991) using Form A and taking objective methods first.....	40.8	33.6	37.3	26.6
Subjects (874) using Form B and taking objective methods first.....	37.0	30.5	35.3	25.2

Turning now to the summary of mean scores (page 98) for the purpose of learning the extent to which this condition is typical of all the smaller groups contributory to the general averages, we are able to present the following facts:

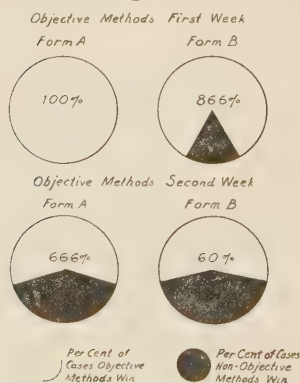


Fig. 7. Percentage of Cases in which Each Method of Presentation Proves Superior. Test for Immediate Recall.

I. Test for Immediate Recall.

When Form A is used and objective methods employed the first week, the objective methods prove superior in fifteen out of fifteen cases.

When Form A is used and objective methods employed the second week, the objective methods prove superior in ten out of fifteen cases.

When Form B is used and objective methods employed the first week, the objective methods prove superior in thirteen out of fifteen cases, with one tie score.

When Form B is used and objective methods employed the second week, the objective methods prove superior in nine out of fifteen cases, with one tie score.

When non-objective methods are used last, they prove superior in but *one* out of thirty cases, with one tie score.

When non-objective methods are taken first, they prove superior in ten out of thirty cases, with one tie score.

II. Test for Deferred Recall.

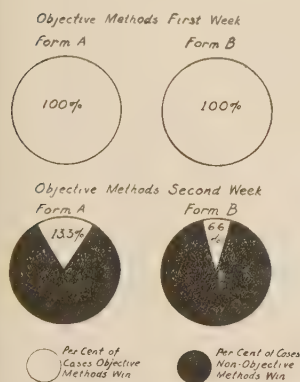


Fig. 8. Percentage of Cases in which Each Method Proves Superior. Test for Deferred Recall.

When Form A is used and objective methods employed the first week, the objective methods prove superior in all of fifteen cases.

When Form A is used and objective methods employed the second week, the objective methods prove superior in but two out of fifteen cases, with one tie score.

When Form B is used and objective methods employed the first week, the objective methods prove superior in all of fifteen instances.

When Form B is used and objective methods employed the second week, the objective methods prove superior in but one out of fifteen instances, with one tie score.

CONCLUSIONS.

The data tend to show that objective methods sometimes facilitate both learning and retention, but the former more than the latter. There is also evidence of an unmistakable kind to prove that objective methods are not equally advantageous with all words. We have information only of a most general kind as to which words are learned better objectively. In the following chapter we will attempt a solution of this most interesting question.

The following scores, representing the work of all the 4,844 subjects thrown together irrespective of form used and order followed, confirm both the contributory data already given and the conclusions drawn from them.

	First Test	Re-Test
Objective Methods	39.4	29.9
Non-Objective Methods	36.2	28.4

CHAPTER VI.

THE WORD-COUNT.

The plan of the experiment called for a word-count that should show the average score made for each of the hundred words by the children who studied the lessons. There were two reasons for undertaking this word-count. The first was the desirability of ascertaining how objective presentation affected the learning of different *types* of words: nouns, adjectives, and verbs; the words that might be expected to appeal to boys and those that would have an attraction for girls; and the two words whose meaning was certainly unknown to practically all the children—*adumbro*, *I stipple* and *delineo*, *I hatch*. The second reason was that without such a count the data of the experiment might easily prove deceptive; and the conclusions, unsound. This reason deserves fuller explanation.

A middle and very tenable position between that of saying that objectivity helps and that of condemning it as a waste of time is to maintain that it is an assistance in the learning of some words and of no benefit, or even a hindrance, in the learning of others. Objective presentation in the case of nouns and adjectives predominantly takes the form of *impression*, the learner merely contemplating the thing with its inherent quality. In the case of verbs, however, objective presentation takes the form of *expression*, the learner representing the thought by action or gesture. Such motor activity might well have a special power to facilitate learning. Nor would it be idle to suggest that nouns, adjectives, and verbs might differ among themselves, with the result that objective methods would prove highly effective with some and not with others.

Now supposing, as might well be the case, that this theory were true, it might happen that objective methods were of great value in the case of half the words used in the lessons, and actually harmful in the case of the other half. It might also happen that

when the material for Form A and Form B was organized, the words were so distributed as to make both forms equally difficult. Of the words studied objectively by pupils using Form A, half—if the theory were true—might fare well because of the objective methods and half might fare ill. These same pupils, when studying the fifty words by non-objective methods, would meet some that suffered from the lack of objective methods and others that did not. Pupils using Form B would be placed in a similar situation; and the result would be that the gross scores in the tests remained approximately the same, completely veiling the fact that a difference in method had been exercising a potent influence.

The count was made from 13,082 papers. As each subject sustained two examinations of fifty words each, these papers represent the equivalent of 6,541 subjects. It will be noted that this number is in excess of the 4,844 subjects who provided the data already given, and that it falls short of the 11,000 who we have said took part in the experiment. The reason for these differences is that the count, because of the magnitude of the undertaking, had to be begun before all the test-papers were received, scored, and checked. Hence on the one hand not all the subjects were represented; and on the other hand there were included the papers of subjects whose scores were ultimately rejected because they were absent from one or more lessons during the *second* week's work or from the tests for deferred recall.

Only the tests for immediate recall were included in the count. No study was made of the tests for deferred recall. Hence whatever conclusions we make from the word-count will apply to the learning, not the retention, of a foreign vocabulary.

The distribution of papers by classes, forms, and orders was as follows:

TABLE III. SHOWING THE DISTRIBUTION OF PAPERS IN THE WORD-COUNT ACCORDING TO GRADE, SEX, FORM USED, AND ORDER FOLLOWED.

NUMBER OF PAPERS				
Grade, Sex, and Order Followed	Form A Objective	Form A Non-Object.	Form B Objective	Form B Non-Object.
Eighth-Grade Boys				
Order Q	141	156	161	241
Order R	81	97	247	252
Order S	160	101	169	118
Order T	183	141	120	146
Eighth-Grade Girls				
Order Q	443	533	170	178
Order R	232	248	182	219
Order S	361	184	169	135
Order T	272	223	179	129
Sixth-Grade Boys				
Order Q	174	238	488	488
Order R	53	69	77	99
Order S	224	193	201	207
Order T	203	142	207	143
Sixth-Grade Girls				
Order Q	361	286	180	336
Order R	182	180	90	273
Order S	114	69	206	171
Order T	436	224	196	201

The averages were computed in the following manner. The tally-sheets, for example, of all eighth-grade boys using Form A, Order Q, were consolidated and the average for each word determined. The same procedure was followed for Orders R, S, and T, and from these four scores the average for the eighth-grade boys was computed. The same four scores for the eighth-grade girls, sixth-grade boys, and sixth-grade girls gave a total of sixteen scores, from which the general average for the word was ascertained. An adding machine was used, and the results were carefully checked.

We see here the advantage of reversing the order of the lessons. The ten words seen in the first lesson when Order Q was followed, were not seen till the last lesson under Order R. The

same thing is true for Orders S and T. Hence each word, on the average, received one presentation and three repetitions.

When the four contributory averages, summed and divided by four, do not produce the general average, the reason is to be found in the fact that decimals have been omitted in the contributory averages.

TABLE IV. SHOWING THE MEAN SCORES IN THE TEST FOR IMMEDIATE RECALL FOR EACH WORD WHEN LEARNED OBJECTIVELY AND NON-OBJECTIVELY. COMPUTED FROM 13,082 TEST-PAPERS.

		. MEAN SCORE				
Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
The Handkerchief (Sudarium) Lesson.						
sudarium.....	O	82.5	83	93	71	84
	N	81.8	86	92	72	78
depictum.....	O	72.5	77	88	53	73
	N	73.1	81	83	61	68
turbo.....	O	87.8	88	93	81	90
	N	85.9	91	92	82	80
fastigatus.....	O	70.6	72	83	59	69
	N	67.3	75	77	54	62
amussis.....	O	80.2	80	91	69	82
	N	79.5	85	87	70	76
recta.....	O	74.4	75	86	64	73
	N	73.3	78	85	60	71
fibula.....	O	73.8	72	90	54	80
	N	73.5	78	90	53	74
refixa.....	O	72.8	73	89	58	72
	N	70.3	76	85	56	65
syngrapha.....	O	84.5	87	92	76	83
	N	79.6	84	90	71	74
subnotata.....	O	78.8	82	91	65	77
	N	76.1	83	87	65	70
The Sewing-Game (Devolve).						
devolve.....	O	77.1	80	87	66	75
	N	72.9	77	84	62	70

Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
frango.....	O	79.3	80	87	71	79
	N	72.6	78	80	63	70
assumo.....	O	67.5	76	82	52	61
	N	62.0	72	77	45	54
insero.....	O	67.6	71	80	56	64
	N	64.3	74	79	47	57
ligo.....	O	85.1	84	90	82	85
	N	84.9	88	89	81	82
quaero.....	O	67.6	69	82	55	66
	N	64.3	70	78	47	64
consuo.....	O	73.3	72	86	64	72
	N	68.4	74	79	54	66
ostendo.....	O	64.3	68	81	46	62
	N	61.5	66	75	43	63

**The Envelope
(Involucrum) Lesson.**

involucrum.....	O	79.8	76	90	72	82
	N	76.6	82	88	64	73
agglutinatum.....	O	85.4	81	94	79	87
	N	82.7	89	92	73	78
culter.....	O	92.1	95	95	92	87
	N	93.6	97	96	92	89
clausus.....	O	83.4	84	89	82	80
	N	84.6	89	91	78	81
acus.....	O	92.3	93	97	90	90
	N	89.4	94	97	83	84
acuta.....	O	89.8	92	93	87	87
	N	85.1	92	95	75	79
capsa.....	O	87.8	89	94	83	86
	N	82.3	89	89	76	75
vacua.....	O	76.9	84	89	62	73
	N	72.7	84	87	57	63
radula.....	O	63.0	64	78	48	61
	N	56.6	66	74	32	55
aspera.....	O	63.6	66	78	49	62
	N	63.3	70	82	46	56

Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
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**Calisthenics and
Paper-Game (Sto).**

sto.....	O	96.9	98	97	95	98
	N	94.0	95	95	92	95
distendo.....	O	69.1	73	80	60	64
	N	63.6	70	75	49	60
deflecto.....	O	58.4	60	73	48	53
	N	54.5	60	66	44	48
percutio.....	O	66.7	74	81	55	58
	N	58.8	70	73	41	52
obliquo.....	O	73.0	73	85	61	73
	N	62.3	71	80	37	62
recurvo.....	O	75.9	77	85	70	72
	N	63.5	76	77	45	57
replico.....	O	64.7	67	81	52	60
	N	55.5	64	70	38	50
scribo.....	O	91.3	92	96	88	89
	N	86.8	91	94	79	83
complico.....	O	67.4	71	82	56	62
	N	61.1	68	77	44	56
terebro.....	O	64.7	64	79	56	61
	N	62.2	69	80	40	60
scindo.....	O	68.1	72	81	53	66
	N	66.6	77	79	52	59
rugo.....	O	71.8	75	84	61	68
	N	63.5	72	75	45	63

**The Bracelet
(Armilla) Lesson.**

armilla.....	O	91.6	88	96	89	93
	N	92.3	92	96	87	94
rotunda.....	O	85.7	89	92	79	83
	N	86.1	90	92	80	83
charta.....	O	92.3	93	96	89	92
	N	91.3	93	95	89	89
regulata.....	O	66.0	75	81	54	55
	N	64.0	76	82	42	56
epistola.....	O	86.4	87	92	81	85
	N	84.6	90	92	76	81
inscripta.....	O	75.3	79	87	67	68
	N	71.9	80	85	57	66

Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
crepundia.....	O	72.8	77	82	66	67
	N	65.9	75	80	50	59
levigata.....	O	66.8	71	77	60	60
	N	62.6	73	76	45	57
vexillum.....	O	89.3	89	93	86	89
	N	83.5	88	89	77	80
tensum.....	O	75.8	79	84	68	72
	N	71.4	78	83	57	68

**The Fan
(Flabellum) Lesson.**

flabellum.....	O	91.9	91	96	87	94
	N	93.6	92	98	91	94
apertum.....	O	74.9	79	83	66	72
	N	80.8	81	89	73	81
funis.....	O	75.6	79	79	74	72
	N	80.2	81	86	75	80
nodatus.....	O	71.9	80	80	62	67
	N	73.4	75	83	65	70
lagma.....	O	81.0	85	88	73	78
	N	83.3	83	90	77	84
obturata.....	O	61.5	67	73	51	54
	N	63.0	59	75	58	60
clavus.....	O	80.8	79	87	81	77
	N	87.0	88	92	85	83
infixus.....	O	71.9	79	80	62	68
	N	75.0	74	81	69	77
liber.....	O	88.0	89	93	84	87
	N	90.4	92	95	86	89
compactus.....	O	66.9	77	73	57	61
	N	70.9	74	84	62	64

**The Drawing Game
(Impono).**

impono.....	O	72.3	75	82	61	71
	N	69.1	74	74	61	69
crepito.....	O	66.1	69	80	52	65
	N	63.5	61	79	51	64
interpunctuo.....	O	74.1	82	87	61	67
	N	74.7	77	87	65	70
quadro.....	O	77.2	81	88	65	75
	N	82.4	83	90	75	81

Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
dimidio.....	O	76.7	79	87	68	74
	N	82.7	86	90	73	81
adumbro.....	O	74.4	80	80	69	69
	N	75.4	74	86	70	72
delineo.....	O	62.4	65	74	55	57
	N	64.6	64	76	55	64
siccio.....	O	84.1	86	93	78	80
	N	77.5	77	83	73	78

**The Bag
(Sacculus) Lesson.**

sacculus.....	O	81.6	87	85	72	82
	N	86.3	89	90	81	85
impletus.....	O	56.4	68	67	42	49
	N	60.5	60	73	47	64
pila.....	O	94.5	96	95	94	93
	N	93.8	96	94	93	93
recens.....	O	87.3	92	94	78	87
	N	88.1	91	92	82	88
hamus.....	O	82.3	86	89	73	82
	N	87.4	90	88	83	90
aduncus.....	O	62.3	74	71	50	54
	N	70.7	72	81	60	70
pupula.....	O	91.3	91	98	83	94
	N	92.0	89	97	87	95
vestita.....	O	83.6	84	95	72	85
	N	85.8	83	93	79	88
digitabulum.....	O	87.9	90	94	80	88
	N	84.8	84	93	76	86
junctum.....	O	77.4	79	88	68	76
	N	76.3	76	84	68	78

**The Gesture-Game
(Elevo).**

elevo.....	O	84.2	89	91	75	82
	N	84.1	87	90	79	80
verto.....	O	70.2	74	82	55	71
	N	62.1	62	74	52	61
pando.....	O	58.7	61	71	44	59
	N	60.2	59	70	49	64

Word		All Sub- jects	Eighth- Grade Boys	Eighth- Grade Girls	Sixth- Grade Boys	Sixth- Grade Girls
pugnito.....	O	62.3	70	76	49	55
	N	60.6	63	71	50	59
complector.....	O	54.9	59	63	46	52
	N	52.7	53	65	42	52
plaudo.....	O	72.6	83	89	52	66
	N	72.9	76	84	66	67
operio.....	O	64.4	68	80	51	59
	N	53.4	54	67	41	51
vello.....	O	69.7	70	85	58	66
	N	63.6	64	74	54	64
arripio.....	O	62.6	69	77	52	53
	N	57.3	59	70	45	55
trudo.....	O	61.2	69	72	44	61
	N	55.7	59	69	45	50
indico.....	O	65.0	71	80	49	61
	N	60.4	64	73	49	54
pulto.....	O	59.8	62	74	44	59
	N	53.8	55	64	46	51

**The Wire
(Filum) Lesson.**

filum.....	O	76.3	80	78	73	74
	N	83.4	86	84	85	79
tectum.....	O	71.6	76	80	61	70
	N	70.4	73	73	69	66
fustis.....	O	77.1	79	84	72	74
	N	81.9	86	83	78	82
incisus.....	O	51.0	54	68	38	44
	N	51.5	53	61	43	48
graphis.....	O	88.9	91	94	81	90
	N	93.0	93	95	92	93
protracta.....	O	68.3	74	81	55	63
	N	72.3	75	81	65	69
muscipula.....	O	81.8	79	90	75	83
	N	70.3	72	77	63	69
aptata.....	O	75.2	81	80	66	74
	N	73.8	72	82	68	73
sarcina.....	O	69.0	70	79	57	70
	N	69.9	73	77	62	68
confecta.....	O	64.9	72	74	54	61
	N	67.1	70	78	61	60

In the following table we give the hundred words of the lessons ranged in the order of their difficulty. The table shows the averages and ranks of each word under objective and non-objective presentation, and also indicates in which form (A or B) the word received objective treatment.

The sigla at the column-heads are to be interpreted as follows:

F indicates form. In this column is given the form in which the word was presented objectively.

O and N, as usual, indicate objective and non-objective presentation respectively.

TABLE V. SHOWING THE HUNDRED WORDS ARRANGED IN THE ORDER OF DIFFICULTY, WITH THEIR MEAN SCORES.

Word	F	MEAN SCORE		RANK	
		O	N	O	N
sto	A	96.9	94.0	1	1
pila	B	94.5	93.1	2	4
acus	A	92.3	89.4	3	10
charta	A	92.3	91.3	3	8
culter	A	92.1	93.6	5	2
flabellum	B	91.9	93.6	6	2
armilla	A	91.6	92.3	7	6
scribo	A	91.3	86.8	8	14
pupula	B	91.3	92.0	8	7
acuta	A	89.8	85.1	10	19
vexillum	A	89.3	83.5	11	25
graphis	B	88.9	93.0	12	5
liber	B	88.0	90.4	13	9
digitabulum	B	87.9	84.8	14	21
capsa	A	87.8	82.3	15	31
turbo	A	87.8	85.9	16	17
recens	B	87.3	88.1	17	11
epistola	A	86.4	84.6	18	22
rotunda	A	85.7	86.1	19	16
agglutinatum	A	85.4	82.7	20	28
syngrapha	A	84.5	79.6	21	36
ligo	A	84.5	84.9	21	20
elevo	B	84.2	84.1	23	24
sicco	B	84.1	77.5	24	38
vestita	B	83.6	85.6	25	18
clausus	A	83.4	84.6	26	22
sudarium	A	82.5	81.8	27	33
hamus	B	82.3	87.4	28	12

Word	F	MEAN SCORE		RANK	
		O	N	O	N
muscipula	B	81.8	70.3	29	60
sacculus	B	81.6	86.3	30	15
lagna	B	81.0	83.3	31	27
clavus	B	80.8	87.0	32	13
amussis	A	80.2	79.5	33	37
subnotata	A	79.9	76.1	34	41
involucrum	A	79.8	76.6	35	39
frango	A	79.3	72.6	36	53
junctum	B	77.4	76.3	37	40
quadro	B	77.2	82.4	38	30
fustis	B	77.1	81.9	39	32
vacua	A	76.9	72.7	40	52
dimidio	B	76.7	82.7	41	28
devolvere	A	76.4	72.9	42	50
filum	B	76.3	83.4	43	26
recurvo	A	75.9	63.5	44	75
tensum	A	75.8	71.4	45	56
funis	B	75.6	80.2	46	35
inscripta	A	75.3	71.9	47	55
aptata	B	75.2	73.8	48	45
apertum	B	74.9	80.8	49	34
recta	A	74.4	73.3	50	48
adumbro	B	74.4	75.4	51	42
interpunctuo	B	74.1	74.7	52	44
fibula	A	73.8	73.5	53	46
consuo	A	73.3	68.4	54	64
obliquus	A	73.0	62.3	55	80
crepundia	A	72.8	65.9	56	68
refixa	A	72.8	70.3	56	60
plaudo	B	72.6	72.9	58	50
depictum	A	72.5	73.1	59	49
impono	B	72.3	69.1	60	63
infixus	B	71.9	75.0	61	43
nodatus	B	71.9	73.4	61	47
rugosus	A	71.8	63.5	63	75
tectum	B	71.6	70.4	64	59
fastigatus	A	70.6	67.3	65	65
verto	B	70.2	62.1	66	82
vello	B	69.7	63.6	67	73
distendo	A	69.1	63.6	68	73
sarcina	B	69.0	69.8	69	62
protracta	B	68.3	72.3	70	54
scindo	A	68.1	66.6	71	67
insero	A	67.6	64.3	72	70
quaero	A	67.6	64.3	72	70
assumo	A	67.5	62.0	74	83

		MEAN SCORE		RANK	
Word	F	O	N	O	N
complico	A	67.4	61.1	75	85
compactus	B	66.9	70.8	76	57
levigata	A	66.8	62.4	77	79
percutio	A	66.7	58.8	78	91
crepito	B	66.1	63.5	79	75
regulata	A	66.0	64.0	80	72
indico	B	65.0	60.4	81	88
confecta	B	64.9	67.1	82	66
replico	A	64.7	55.5	83	95
terebro	A	64.7	62.2	83	81
operio	B	64.4	53.4	85	98
ostendo	A	64.3	61.5	86	84
aspera	A	63.6	63.3	87	78
radula	A	63.0	56.6	88	93
arripio	B	62.6	57.3	89	92
delineo	B	62.4	64.6	90	69
pugnito	B	62.3	60.6	91	86
aduncus	B	62.3	70.7	91	58
obturata	B	61.5	59.1	93	90
trudo	B	61.2	55.7	94	94
pulto	B	59.8	53.8	95	97
pando	B	58.7	60.3	96	89
deflecto	A	58.4	54.5	97	96
impletus	B	56.4	60.5	98	87
complector	B	54.9	52.7	99	99
incisus	B	51.0	51.4	100	100

ANALYSIS OF THE DATA OF THE WORD-COUNT.

Let us first examine the record of pupils who used Form A, comparing the scores made by them in the objectively-presented words with those made in the non-objectively presented words. In Tables VI and VII the columns headed W give us the words known out of a possible eight, ten, or twelve, as the case may be.

TABLE VI. SHOWING THE SCORES OF ALL PUPILS USING FORM A,
BY LESSONS.

OBJECTIVELY-PRESENTED WORDS			NON-OBJECTIVELY-PRESENTED WORDS		
Lesson	%	W	Lesson	%	W
The Handkerchief (<i>Sudarium</i>) Lesson..	77.8	7.8	The Fan (<i>Flabellum</i>) Lesson..	79.8	8.0
The Sewing-Game (<i>Devolve</i>)	72.7	5.8	The Drawing-Game (<i>Impono</i>)	73.7	5.9
The Envelope (<i>Involucrum</i>) Lesson.	81.4	8.1	The Bag (<i>Sacculus</i>) Lesson....	82.6	8.3
Calisthenics and the Paper-Game (<i>Sto</i>)...	72.3	8.7	The Gesture-Game (<i>Elevo</i>)	61.4	7.4
The Bracelet (<i>Armilla</i>) Lesson....	80.2	8.0	The Wire (<i>Filum</i>) Lesson	73.3	7.3
Total Words Known...		38.4	Total Words Known...		36.9

The first thing to be observed is that there is an advantage here in favor of the words seen objectively. The pupils learned 38.438 out of fifty words under objective presentation, and 36.836 out of fifty words under non-objective presentation. These averages agree very closely with the mean scores reported above in the frequency distributions. The lack of perfect agreement is due to the fact that in the word-count small groups, as, for example, Sixth-Grade Boys, A R, have as much weight as larger groups.

About two-thirds of whatever superiority the objective-method words here display is due to Lesson IV (Calisthenics and the Paper-Game.) Compared with its corresponding lesson (The Gesture-Game), this lesson either lends itself better to objective presentation or contains easier words.

Let us next examine the scores of the pupils who used Form B.

TABLE VII. SHOWING THE SCORES OF ALL PUPILS USING FORM B,
BY LESSONS.

NON-OBJECTIVELY-PRESENTED WORDS			OBJECTIVELY-PRESENTED WORDS		
Lesson	%	W	Lesson	%	W
The Handkerchief (<i>Sudarium</i>) Lesson...	76.0	7.6	The Fan (<i>Flabellum</i>) Lesson	76.4	7.6
The Sewing-Game (<i>Devolvo</i>)	68.9	5.5	The Drawing-Game (<i>Impono</i>)	73.4	5.9
The Envelope (<i>Involucrum</i>) Lesson.	78.7	7.9	The Bag (<i>Sacculus</i>) Lesson	80.5	8.1
Calisthenics and the Paper-Game (<i>Sto</i>)...	66.0	7.9	The Gesture-Game (<i>Elevo</i>)	65.5	7.9
The Bracelet (<i>Armilla</i>) Lesson....	77.4	7.7	The Wire (<i>Filum</i>) Lesson	72.4	7.2
Total Words Known...		36.6	Total Words Known...		36.7

It is evident that the parallel lessons and the total words known correspond almost perfectly. There is no apparent advantage for either method.

Up to this point we have been comparing the scores made by children when studying objectively with the scores made by the same children when studying non-objectively. Let us now institute a comparison between the scores made on each lesson when studied objectively with the scores made on the same lesson when studied non-objectively. This of course means that we are making a cross-comparison between different groups of subjects.

TABLE VIII. SHOWING AVERAGES BY LESSONS FOR OBJECTIVE AND NON-OBJECTIVE PRESENTATION.

	Average	
	Objective Presentation	Non-Objective Presentation
The Handkerchief (<i>Sudarium</i>) Lesson..	77.79	76.04
The Sewing-Game (<i>Devolvere</i>).....	72.73	68.86
The Envelope (<i>Involucrum</i>) Lesson....	81.41	78.69
Calisthenics and the Paper-Game (<i>Sto</i>)..	72.33	66.03
The Bracelet (<i>Armilla</i>) Lesson.....	80.20	77.36
The Fan (<i>Flabellum</i>) Lesson.....	76.44	79.78
The Drawing-Game (<i>Impono</i>).....	73.41	73.74
The Bag (<i>Sacculus</i>) Lesson.....	80.46	82.57
The Gesture-Game (<i>Elevo</i>).....	65.47	61.40
The Wire (<i>Filium</i>) Lesson.....	72.41	73.34

These averages show that objective presentation proved superior in the case of six of the ten lessons—the first five, and the ninth. Now it will be noted that the first five lessons were those studied objectively by the subjects using Form A. There are, then, two possible explanations of this phenomenon. One is that the Group-A subjects were superior to the Group-B. If this principle is accepted, it will follow as a corollary that the Gesture-Game was exceptionally well suited to objective presentation, since the inferior subjects using Form B made a much better score in it. The second explanation is that some words are learned better objectively; others, non-objectively: and that the better distribution of words was found in Form A.

One final step must be taken before this question can be settled. Six of the ten lessons contain both nouns and adjectives, and we have not as yet made any distinction between the two classes of words. Let us therefore present the last tabulation to be given in this section; that namely of the scores arranged according to the parts of speech—nouns, adjectives, and verbs.

TABLE IX. AVERAGE SCORES ARRANGED ACCORDING TO PARTS OF SPEECH.

	MEAN SCORES	
	Form A	Form B
NOUNS		
Presented Objectively.....	83.7	83.2
Presented Non-Objectively.....	85.2	81.1
ADJECTIVES		
Presented Objectively.....	75.9	69.7
Presented Non-Objectively.....	72.0	73.6
VERBS		
Presented Objectively.....	72.5	68.6
Presented Non-Objectively.....	66.3	67.2

It should be observed that the subjects using Form A showed almost no superiority to those using Form B when the scores made by the two groups for the words learned non-objectively were examined. The words known out of a possible fifty are 36.836 for Form A and 36.642 for Form B. Yet there were points of superiority and inferiority which, as we suspected might be the case, were concealed in the gross averages given. In the learning of words studied non-objectively, the Form-A subjects were superior in the case of the nouns, but inferior in the case of the adjectives and verbs. When words are learned objectively, this condition is almost entirely reversed; the nouns remain substantially the same; but in the case of adjectives and verbs, the Form-A subjects prove superior.

If the Form-A subjects were in general a "superior group," their greater power should be manifested consistently. But in the six comparative measurements just given, the Form-A subjects are actually inferior in two cases, and in one case their superiority is negligible. We therefore incline to the belief that some words profit, some suffer, from objective presentation. Let us endeavor, by studying the data of the word-count, to identify these words.

We will accept as *highly probable* the principle that when the score made under objective presentation differs considerably from that made under non-objective presentation, the difference is to be attributed to the method rather than to any other variable factor. A considerable difference is arbitrarily taken to be one of 4.9 per cent or more.

We find, then, in Form A five nouns that profit very much from objective presentation. We do not find any that suffer from it. These nouns, with the scores, are:

syngrapha, 84.5, 79.6*
 capsula, 87.8, 82.3
 radula, 63.0, 56.6
 crepundia, 72.8, 65.9
 vexillum, 89.3, 83.5

On the other hand, we find only one noun in Form B that profits greatly by objective presentation:

muscipula, 81.8, 70.3

But we find three nouns and two adjectives that suffer under objective presentation in Form B:

clavus, 80.8, 87.0
 hamus, 82.3, 87.4
 filum, 76.3, 83.4
 apertum, 74.9, 80.8
 aduncus, 62.3, 70.7

Turning now to the verbs, we discover a fact of extreme interest and vital importance. There are four lessons containing verbs. Excluding for the moment the Drawing-Game, presented objectively in Form B, there are thirty-two verbs in the other three lessons. Of these thirty-two verbs, thirty—all but two—are *learned better objectively*.

But in the Drawing-Game, *five of the eight words are learned better non-objectively*. This lesson, instead of raising the score of Form-B subjects, pulled it down. Here we have the chief reason for the fact that Form-B subjects learned words non-

* The first score is always the objective-method score.

objectively just about as well as did Form-A subjects, but fell below them when studying objectively. It is true that the Form-B subjects made a comparatively good score in the Drawing-Game; but in order to maintain the balance between the two forms, they should have made a better score than they did.

Nor is it difficult to locate the defect in the Drawing-Game. In all the other games the actions could be performed as rapidly as the words could be uttered. The Sewing-Game would be an exception to this rule, were it not for the fact that one specially selected and trained demonstrator performed the actions before the class, the other pupils merely looking on. But in the Drawing-Game all the pupils had to take out pen and paper; they were required to draw a square; to divide it in half; to stipple; to hatch; to take up their blotters and dry what they had drawn. The actions required close attention and the expenditure of some little time; they involved, therefore, both a distraction and a wastage of energy.

Gouin, as we have seen, wished language to be taught by action-games in which the verb was to be the chief element. The other parts of speech were to be caught up by the verb, as filings by a magnet, and lifted by it to its own level.

Our own data show that thirty-three out of forty verbs were learned better objectively; and in the case of five of the seven not learned better that way, there is an obvious explanation for the failure.

Should we put more of the dynamic element into our vocabulary-work in Latin? Should we organize the work in the form of actions, games, or *things to be done*?

The verb, certainly, appears to be the point of departure. As regards nouns and adjectives, we have seen that objective and non-objective presentation serve almost equally well in the case of forty-nine out of sixty words. Of the eleven words where the scores differ by 5 per cent or more, six profit by objective presentation and five do not. But with verbs the benefit of objective presentation is far more general and conspicuous. Furthermore, the verb, of all the parts of speech that occur in large numbers, is the most difficult to learn.

The point deserves careful and scientific study. But before allowing ourselves to be carried away by the enthusiasm which the prospect of great changes based upon some simple discovery always provokes, we must take cognizance of four facts not to be disregarded here:

First, the data of the present experiment are limited.

Secondly, so far as the special effect of objective presentation in the case of nouns, adjectives, and verbs is concerned, the facts brought to light concern *learning*, not *retention*, since the word-count dealt only with the tests for immediate recall.

Thirdly, an unappraisable portion of the total effect may have been due to the novelty of the method of presentation. In other words, the benefit might not extend equally to larger areas.

Fourthly, the words used were chosen after much study as specially suited to objective presentation. There may be—almost certainly are—large blocks of words that can not be presented objectively. Further, in the case of those that can be so presented, it is easy to incur a fatal loss of time; this is evident from the fact that the author himself, despite so much care, was successful in the construction of only three lessons out of four containing verbs. Finally, it must be remembered that objective methods not only cost more but also require a superior type of teacher. The conventional method of teaching a Latin vocabulary is within our means, and we understand its technic. The benefits discovered in objective methods during a highly-controlled experiment might not be equally manifest in the daily routine of classroom work.

THE EFFECT OF OBJECTIVE METHODS ON AGE AND SEX.

All the subjects were helped by objective methods when verbs were concerned. Of the nouns and adjectives, about half seemed adapted to objective presentation. These points are made clear by the following table.

TABLE X. SHOWING THE NUMBER OF WORDS THAT PROFITED BY OBJECTIVE PRESENTATION, ARRANGED BY AGES, SEXES, AND TYPES OF WORDS.

Number of words learned better by objective methods			
	Nouns (Total, 30)	Adjectives (Total, 30)	Verbs (Total, 40)
Eighth-Grade Boys.....	7	14	31
Eighth-Grade Girls.....	17	15	33
Sixth-Grade Boys.....	13	12	28
Sixth-Grade Girls.....	16	15	27

As regards the words that appealed especially to boys or girls, the data indicate that objective methods do not gain in effectiveness when the objects provoke an emotional reaction, whether the same be favorable or unfavorable. The scores in the Sewing-Game indicate that there is benefit not only in performing the actions oneself but even in seeing them performed by another. The eighth-grade boys did not react well to this game when presented objectively, and the general data at hand concerning verbs lead us to suspect that this was due to the fact that they sneered at it as girlish. The two verbs whose meaning was unknown, *adumbro* and *delineo*, were in general learned better non-objectively. While the failure of the objective-method scores to be higher must probably be attributed to the loss of time occurring in the Drawing-Game, we must also note that the non-objective scores, as compared with those of other words, are more than satisfactory. However criminal it may be to force a child to memorize unintelligible meanings, the data indicate that it is not a difficult process psychologically.

This is indeed only what we might have anticipated. The memory of school-children is leagues ahead of their comprehension. In the school and only in the school will the child—must the child—commit to heart things that convey no meaning to him.

TABLE XI. SHOWING THE AVERAGE SCORES MADE IN CERTAIN WORDS AND GAMES POSSESSING AN EMOTIONAL APPEAL AND IN TWO DIFFICULT WORDS.

AVERAGE SCORES								
	8th-Grade Boys		8th-Grade Girls		6th-Grade Boys		6th-Grade Girls	
	Obj.	Non-Obj.	Obj.	Non-Obj.	Obj.	Non-Obj.	Obj.	Non-Obj.
<i>Acus, needle</i>	93	94	97	97	90	83	90	84
<i>Armillæ, bracelet</i>	88	92	96	96	89	87	93	94
<i>Crepundia, marble</i>	77	75	82	80	66	50	67	59
<i>Culter, knife</i>	95	97	95	96	92	92	87	89
<i>Fibula, barette</i>	72	78	90	90	54	53	81	74
<i>Flabellum, fan</i>	91	92	96	98	87	91	94	94
<i>Hæmus, hook</i>	86	90	89	88	73	83	82	90
<i>Pila, ball</i>	96	96	95	94	94	93	93	93
<i>Pupula, doll</i>	91	89	98	97	83	87	94	95
<i>Radula, grater</i>	64	66	78	74	48	32	61	55
<i>Turbo, top</i>	88	91	93	92	81	82	90	80
<i>Adumbro, I stipple</i>	80	74	80	86	69	70	69	72
<i>Delineo, I hatch</i>	65	64	74	76	55	55	57	64
<i>Calisthenics</i>	76	74	84	78	65	51	70	62
<i>Sewing-Game</i>	75	75	84	80	62	55	71	66

CHAPTER VII

ANCILLARY STUDIES

A. STUDIES IN THE DATA THEMSELVES.

1. THE EFFECT OF SEX

The girls did consistently better work than the boys. Comparing the eighth-grade girls and the eighth-grade boys, we find that in the first test for the words learned objectively the girls made a higher score in 15 of a possible 17 instances. In the re-test they made a better score in 14 of a possible 17 instances. For the words learned non-objectively, the girls made a better score in the first test in 16 of a possible 17 instances; and in the re-test, in 12 of a possible 17 instances.

The sixth-grade girls made a slightly better record. For the words learned objectively, they made a higher score in 16 of a possible 17 instances in the test, and in 15 of a possible 17 instances in the re-test. For the words learned non-objectively, they made a higher score in 17 of a possible 17 instances in the test, and in 12 of a possible 17 instances in the re-test.

Including the four tests involved, the average superiority of the eighth-grade girls over the eighth-grade boys was 3.1%; the average superiority of the sixth-grade girls over the sixth-grade boys was 2.0%.

The scores of the sixth-grade boys and girls were not so low as to indicate that Latin, so far as the learning of the vocabulary is concerned, could not be begun in the sixth grade. Nor do objective methods seem to be particularly suitable in the lower grades. When the non-objective methods were used during the first week, the sixth-grade classes that used Form A did 0.6 better without the pictures, while those that used Form B did 1.7 better with them. When the pictures were used the first week, they did not do during the second week the work that data taken from other sources indi-

cate they could have done. Their work in the re-test was particularly poor, the scores being 26.7 for Form A and 21.0 for Form B.

2. THE EFFECT OF MENTALITY.

The purpose here was to ascertain whether objective methods were specially suitable for inferior pupils. An inferior pupil was arbitrarily taken to mean one who made a gross score of less than 30 in the test and re-test for either of the two methods; for example, one who made 18 in the test for immediate recall in the objective block, and 10 in the test for deferred recall in the same block. About 3,000 scores were inspected, from which were gathered data on 96 eighth-grade and 293 sixth-grade pupils.

Of the eighth-grade pupils, 58 did better with the pictures, and 38 without them. Of the sixth-grade pupils, 169 did better with the pictures and 124 without them.

There is, however, little value in these data. For of the pupils who did better with the pictures, fully two-thirds belong to groups that used the pictures the first week. Now if, as the writer believes, to let children have the pictures the first week and then take them away and impose a less attractive method has an especially bad effect on motivation, it is only reasonable to suppose that this effect would be conspicuously evident in the backward pupils, who of their nature are less able to overcome difficulties and master reluctance.

One fact, however, is apparent; namely, that a goodly proportion of the inferior pupils did better under the non-objective methods. Even though the reason suggested in partial explanation of the superiority of objective methods in 227 cases be rejected, there still remain the 162 cases in which the objective methods proved less advantageous.

B. SPECIAL STUDIES.

1. THE PUPILS' QUESTIONNAIRE.

All those who studied the lessons were given a questionnaire to answer after the second week's work was over. The questionnaire read as follows:

PUPIL'S QUESTIONNAIRE.

Was it easier to learn the words without the pictures or with them?

Why?

Put your name and grade here

.....

This questionnaire was answered by all pupils who had had experience of the two methods, even though they were absent from some of the lessons. The total vote was therefore about 10,000.

Thirty-four children said "It didn't make any difference," or "It was all the same," or "They didn't know." "A person can learn any way if he wants to work," declared one boy with a wisdom in advance of his years.

Three hundred and ninety-six pupils declared that they could learn better without the pictures. The rest of the votes were overwhelmingly in favor of the pictures.

The teachers of the country have been so thoroughly imbued with a reverence for objective methods that there exists a general inability to conceive any situation under which such methods are not preferable. Throughout the two years during which he was engaged in this experiment, the writer met but three persons who were not positive that the Latin words would be learned better when presented objectively, and these three did no more than express a mild doubt. The prevalent impression among those who co-operated in the experiment was that the writer was working out a plan for the better and more effective teaching of Latin.

The writer felt, although aware of the fact that children who might wish to vote in favor of the pictures would frequently turn to the teacher for help in wording their reason, that there were indications of teacher-suggestion in the votes that were being received; and early in the experiment he began to send out with his material a warning to the effect that pupils should be left entirely free in expressing their own opinion. He explained that his purpose was not to prove a theory but to establish facts, and urged all the experimenters to manifest no preference for either one of the two methods. This warning, however, did not alter the trend or tenor of the voting.

Many of the reasons given for or against the pictures were of little value. "Because it was easier," "Because I could remember the words better," "Because I made a better score," "Because I did not have to work so hard," were answers frequently received. A comparatively large number said, "Because the words were easier." This statement was made with almost equal frequency (so far as a rough inspection of the questionnaires could indicate) in favor of each of the two blocks of words.

The chief reason given in favor of the pictures, couched in very many different forms, was, "Because they form an image in the mind." "They help us see what the word means," "They give us a picture of the thing," "They show us what it is," and many other similar expressions were used to convey this idea.

As in the case of the group that voted for the pictures, so those who voted against them gave a number of naive and valueless answers.

1. "I can remember better." (Sixty-two children.)
2. "Because you don't remember so much." (One child.)
3. "Because in the first test I got 100, and in the second I missed some." (Six children.)
4. "It was harder work with the pictures." (Six children.)
5. "The words were easier." (Seven children.)
6. "I do not know why." (Two children.)

When considering the more suggestive answers given by the group that voted against the pictures, the writer can not but regret that he worded the questionnaire as he did. He felt that when children were asked whether it was easier to learn the words with the pictures or without them; they would take the expression "with the pictures" as descriptive of the entire mechanism of the objective form of presentation. The facts revealed by the word-count lead him to suspect that pictures and objects are of very doubtful value, and that it is the motor activity involved in performing an action, or even the sight of another performing it, that has power to make objective presentation superior to non-objective. The expression "to learn the words with the pictures" failed to direct attention to the question of the acting-out of the verbs, if indeed it did not positively exclude it. Not a single child distinguished

between nouns and verbs in answering the questionnaire. The writer feels, then, that the answers given refer predominantly if not exclusively to objects and pictures of objects. If this be true, we know from the data of the word-count that the objections brought forward against the "pictures" have some foundation in fact. The principal objections are listed here in the hope that they may suggest some means of attacking the question opened up by the experiment; namely, why objective presentation is harmful with nouns and adjectives as often as it is beneficial, but uniformly helpful with verbs.

1. "Because studying them takes too much time from studying the word." (One pupil.)

2. "They attracted my attention." (Twenty children.)

3. "My mind was on the pictures, not on the words." (Fifty-three children.)

4. "You did not have to look at the pictures." (Nine children.)

5. "I get interested in them and forget what the word is." (Two children.)

6. "I was more interested" (that is, in the pictures). (One child.)

7. "Because you look at the pictures, not at the words." (Five children.)

8. "The words made a greater impression on my mind." (One child.)—That is, the printed couplet contained the material to be learned, and looking at the printed couplet was what helped the learning-process.

9. "Because we could put it on paper and learn it." (One child.)—That is—probably—the way to get us to learn things like this is to put down on a piece of paper what you want learned and let us get down to work on that.

10. "When I get the picture in my mind I can't think of the word." (Six children.)

11. "Because I could learn the Latin word from the English." (Three children.)

12. "The pupil relies on the picture instead of on the word." (One child.)

13. "The pictures interfere with study." (One child.)

14. "The pictures make you inquisitive." (One child.)—That is, you waste time looking at them.

15. "Because we could go over them (the words) faster and more times."

16. "To know them by heart."—If we may venture an interpretation of this answer, the meaning is that the task assigned was to learn the meanings of the words by heart, and that the pictures did not assist in this process.

17. "I got them mixed up in my mind."—Surely it would be interesting to secure the introspections of pupils who give this answer. Precisely what was the nature of the resultant confusion? Sixty-seven pupils gave this answer.

18. "I would rather fix a picture of my own in my mind than a real picture." (Twenty-three children.)—Another answer making us regret that these children are scattered throughout the country where they can not be interviewed.

19. "Because I got them easier. I just had the words to think of, and not the picture or action." (One child.)

20. "Because you can make a better picture in your mind." (One child.)

21. "Because with the pictures we did too much oral work." (Two children.)

22. "I could not see the pictures." (One child.) That is (probably), I could not recall the image when repeating the words.

23. "Because I had practice." (Three children.)—Another answer that goes deep into the psychology of the matter. In the space of six or seven years our school-life changes audiles into visuals. Would children learn better from the pictures if they had more time to catch the knack of it?

24. "Because it made you think harder." "Because it made you study harder." (Four children.)—Angell did not express the truth more aptly. One may remember best what he has to work harder to get.

25. "I know what each English word means and don't need the picture." "Because we know what they mean." (2 children.)

The answer here given contains a great deal of truth when there is question of nouns and adjectives. It remains for some

student of psychology to discover why verbs are governed by a different law.

We must not fail to note that while many children voted against *pictures*, not one condemned the use of *objects* or the *acting out of the verbs*.

2. THE ELIMINATION OF THE ILLUSTRATED LESSONS.

During his experiments of 1921-22 the writer exposed the objects and had the class go through the actions, but used no illustrations. During the study-period both groups, the objective and the non-objective, studied from the same kind of material; namely, mimeographed sheets containing the words to be learned.

It seemed to him then that possibly he was securing too little of the objective element. The lessons were thirty minutes in length, of which about ten or twelve minutes were devoted to the presentation of the new words, about the same amount of time to individual study, and the remainder to concert-drill. The objection might be made, he thought, that the procedure for both groups was identical during the larger portion of the lesson. His reaction was a determination to secure in his later work "the maximum amount of objectivity possible under normal classroom conditions." Consequently, in addition to requiring the exposing of the object and the performance of the action, he provided the illustrated lessons from which the objectively-taught group were to do all their studying.

But it did not escape him that the effects of objective presentation were psychological if anything, and that a second or less might be sufficient for their full realization. In other words, the danger of providing too much objectivity was as great as that of providing too little.

This thought was kept before his mind by the statements contained in some of the questionnaires to the effect that the pictures were a distraction, or that the pupils spent too much time looking at them. The writer also felt that the illustrated lessons were very large for little children to handle conveniently.

For these reasons he determined to organize a group in whose case the procedure should be entirely identical with that of the

main experiment with one only exception; namely, that during the study-period the pupils were to use small unillustrated lessons instead of the large illustrated ones.

Form B was selected as the one to be used. The pupils began with the unillustrated (non-objective) lessons, studying the words just as had been done by all the other pupils who took part in the main experiment. The lessons were read aloud and repeated; the usual time was given to individual study; then followed the concert-drill and the short test with a few words. At the end of the week's work the usual test was administered.

During the second week Lessons 6-10 of Form B were taught. The objects were displayed and the actions performed as prescribed in the Teacher's Guide. But when the time for individual study arrived, the teacher, instead of having the pupils study from the large illustrated lessons, made use of the unillustrated lessons of Form A, which contained the same words that occur in the illustrated lessons of Form B.

The teachers conducting this experiment were instructed with particular minuteness and care; although as a matter of fact the only thing that needed to be said was that the Teacher's Guide was to be followed in every respect with the exception of the change in the printed material during the second week.

Fourteen schools, with a total of about 600 children, were represented in the experiment. There occurred the usual loss due to absence, as a result of which the number found in the final tabulation is only 260. The geographical distribution of these schools was as follows:

Ohio	3	Illinois	1
Louisiana	2	Nebraska	1
Iowa	3	Arkansas	1
Mississippi	1	Missouri	2

The greater number of the pupils were in eighth-grade; the remainder were in sixth. The experiment was conducted during the month of March. The results were as follows:

TABLE XII. SCORES OF 260 PUPILS IN 14 SCHOOLS STUDYING 50 WORDS OBJECTIVELY AND 50 WORDS NON-OBJECTIVELY WITH UNILLUSTRATED LESSONS.

MEDIAN SCORES				
	Objective Words		Non-Objective Words	
	Test	Re-Test	Test	Re-Test
50	72	11	59	5
45	50	33	70	36
40	38	23	31	45
35	30	33	24	33
30	22	36	20	31
25	20	36	25	23
20	8	24	15	29
15	10	27	7	28
10	8	21	3	14
5	1	11	6	14
0	1	5	..	2
N	260	260	260	260
Md.	43.9	30.8	44.8	33.2

Just as in the main experiment, so here the first test reveals little difference between the two methods, while the re-test after a month shows that the words learned non-objectively are retained better. The relative scores of this special group and all the BQ- and-BR-pupils in the main experiment are shown in the following tabulation.

MEDIAN SCORES

	Objective Words		Non-Objective Words	
	Test	Re-Test	Test	Re-Test
Main Experiment....	39.7	27.6	39.0	28.5
Ancillary Experiment.	43.9	30.8	44.8	33.2

The experiment, however, proves little or nothing. For we now know that the words taught objectively in Form B are learned better non-objectively, and also that it is unsafe to compare the

work done by children during one week with the second week's work of the same children. Had the writer known these facts when this experiment was organized, he would have extended its scope by securing more subjects and by using Form A as well as Form B.

If it is true that the *flabellum*-block—the one presented objectively in Form B—is learned better non-objectively, we are prompted to inquire why the removal of a portion of the objective element—that is, the illustrated lessons—did not increase the comparative ease with which it was learned.

The experiment, then, presents new problems to be solved rather than solutions of old ones. The results are published only because of the possible value of the data when taken in conjunction with other facts. The small number of the subjects involved would of itself inject a strong element of uncertainty into any conclusions drawn from the data.

3. EXTENDING THE CURVE OF FORGETTING TO THE THIRD MONTH.

The general technic of the experiment called for a final end-test to be sustained a month after the completion of the work. This would appear to be a sufficiently long interval to give a true picture of the effect of disuse on the function, and hence of the efficiency of the first learning.

The writer, however, met teachers who maintained a position substantially like the following: That time would take its toll first of what had been superficially learned; that after a short lapse of time the loss might be about the same for either method; that the words learned with the fullest and most complete dependence on objective methods would be profoundly—nay, almost ineradicably—engraved upon the memory; and that in consequence after a greater lapse of time these would be found to be the only words that had been retained.

It was accident rather than design that enabled the writer to apply some sort of a test to this theory. Through an oversight a few schools were not supplied with the blanks necessary for the re-test. Some time passed before the omission was observed, and it was then decided to re-test these pupils after three months instead of after one.

As was done consistently throughout the experiment, the scores of all pupils who had missed even one lesson were cast out; and as usual this practice greatly reduced the available data. The tabulations follow.

TABLE XIII. SHOWING SCORES OF 135 SUBJECTS RE-TESTED AFTER THREE MONTHS.

MEDIAN SCORES				
	Objective Words		Non-Objective Words	
	Test	Re-Test	Test	Re-Test
50	25	2	31	6
45	26	15	24	14
40	10	4	14	12
35	13	5	12	7
30	14	18	15	12
25	14	10	12	16
20	17	18	11	12
15	5	18	3	15
10	8	10	6	11
5	2	18	7	16
0	1	17	..	14
N	135	135	135	135
M	37.5	21.3	40.5	24.8

In this experiment the pupils retained after three months 60 per cent of the material learned non-objectively, and only 57 per cent of the material learned objectively. It would therefore appear that objective methods do not make for improved retention even after three months. To extend the time much farther would be to reach a point where the amount retained under either method was not worth considering.

Some of the subjects involved had used Form A, which others had used Form B. This fact will at once suggest the precautions necessary in applying the conclusion drawn by us from the data.

4. EXTENDING THE TIME OF THE EXPERIMENT TO FOUR WEEKS.

One pupil, in giving a reason for his assertion that he could not learn so well with pictures, said: "Because we are not used to it." Doctor Pillsbury, of the University of Michigan, expressed the same idea when he suggested that in view of the novel character of the work, different results might follow if the experiment were of longer duration.

As it was impossible to expect many schools to give a great deal of time to an experiment of this sort, the writer had to choose between a long experiment with a limited number of subjects and a shorter experiment with many subjects. He chose the second alternative, and considered himself fortunate in being able to find so many schools willing to give even that amount of time to the work.

But in order not to neglect this important aspect of the problem, the writer carried through two experiments which we may now proceed to describe.

EXPERIMENT ONE.

The subjects in this experiment were eight parochial-school children of Alton, Illinois. Four of these children were to learn words by objective methods; the other four, by non-objective. The writer had no desire to equate these pupils in any way, the only requirement being that they were to be eighth-grade pupils. As stated elsewhere, it was his conviction that an intelligence test is an uncertain means of equating subjects when the function to be studied is verbal memory-work. The unreliability of the test would be all the greater in the case of a small group. A possible means of equating the subjects would be to test their ability to commit words to memory; but if this were done, the process of equating the subjects would differ in little from the experiment itself. In the opinion of the writer, the vital data were to be derived from the parallelism or non-parallelism of the graphs representing the results. Be the groups equal or unequal to begin with, the question would be whether the group using objective methods drew away from the other group as time went on. Should

this prove to be the case, it would indicate that a greater ability to profit by objective methods was developed with usage.

Although this point of view was explained to the two teachers who were to have charge of the groups, they endeavored in selecting the subjects to find children who in their judgment would show equal ability, group by group, in the type of work involved.

The material to be used by the objective-method group was prepared as follows: A sufficient number of white 3x5-inch 4-ply cards were procured, on each one of which was mounted a picture of some object. Under the object was printed the Latin name with its English equivalent. A complete set of these cards was made ready for each of the subjects, so that every pupil always had his own material available.

The non-objective-method group used lists of words without any illustrations. The type of material used for the two groups is made plain by the accompanying cut.



cingulum,
belt

T U E S D A Y

scrinium, cabinet
cirnea, churn
vexillum, flag
siphon, faucet
capistrum, collar
lamina, blade
linteolum, bib
ephippium, saddle
mantele, towel
sebaceus, candle

Fig. 9. Showing the Material Used in the Four-Weeks' Experiment.

A number of very unusual words were introduced, the material for these being taken principally from hardware catalogs. It was necessary, of course, to coin a number of words; in the list given later these words are indicated by an asterisk.

The subjects studied ten minutes each day on Monday, Tuesday, Wednesday, Thursday, and Friday. Each day they were given ten words, and studied those words and all others previously given during the same week. Each Monday an entirely new block of fifty words was begun, no reference at all being made to the words of the preceding weeks. Each day, at the conclusion of the study-period, the teachers examined the subjects orally on as many of the words as they could ask in two or three minutes.

As regards the motivation of the children, the teachers explained to them in the beginning the magnitude of the experiment being carried on and the importance of the contribution they themselves might make. No prizes, immunities, or rewards were to be offered to either group. The teachers were allowed during the first week to encourage and animate the children according to their own judgment; but from that time on nothing was to be said except that they "must study their words according to their promise." As the weeks passed, the children in both groups displayed more and more reluctance, and the teachers complained that this was a heartless and inhuman way of handling children; but the writer insisted that nothing more be said or done, lest external stimuli and indirect interest should interfere with the spontaneous reactions of the subjects to the material.

No child missed any of the lessons during the entire course of the experiment.

The tests were given each Friday after the study-period for that day, the fifty words of the week in question being included. The word-lists for the four weeks are here given in full, the words that were coined for the occasion being indicated by asterisks.

FIRST WEEK

<i>erumena, purse</i>	<i>penicillus, brush</i>
<i>sacculus, bag</i>	<i>sedile, chair</i>
<i>armilla, bracelet</i>	<i>involverum, envelope</i>
<i>toga, coat</i>	<i>puer, boy</i>
<i>ocreae, leggings</i>	<i>pecten, comb</i>
<i>pila, ball</i>	<i>vir, man</i>
<i>crepitaculum, rattle</i>	<i>antlia, pump</i>

olla, <i>pot</i>	tibiale, <i>stocking</i>
poculum, <i>cup</i>	liber, <i>book</i>
pileus, <i>cap</i>	annulus, <i>ring</i>
tegula, <i>slate</i>	calamus, <i>pen</i>
creta, <i>chalk</i>	catena, <i>chain</i>
nux, <i>nut</i>	amussis, <i>ruler</i>
speculum, <i>mirror</i>	cubile, <i>bed</i>
graphis, <i>pencil</i>	pigmentum, <i>paint</i>
scyphus, <i>tumbler</i>	*umbraculum, <i>shade</i>
mensa, <i>table</i>	grabatus, <i>sofa</i>
perspicillum, <i>spectacles</i>	fereulum, <i>tray</i>
atramentum, <i>ink</i>	amphora, <i>vase</i>
cochlear, <i>spoon</i>	fibula, <i>button</i>
solarium, <i>clock</i>	saccharum, <i>candy</i>
corbis, <i>basket</i>	cortex, <i>cork</i>
lampas, <i>lamp</i>	parvulus, <i>baby</i>
*rotulae, <i>skates</i>	patera, <i>bowl</i>
lanx, <i>plate</i>	*glans, <i>bullet</i>

SECOND WEEK

clavus, <i>nail</i>	*exacutor, <i>sharpener</i>
malleolus, <i>hammer</i>	indusium, <i>shirt</i>
stragulum, <i>blanket</i>	scopae, <i>broom</i>
canis, <i>dog</i>	malleus, <i>mallet</i>
equus, <i>horse</i>	felis, <i>cat</i>
focus, <i>stove</i>	frenum, <i>bridle</i>
novacula, <i>razor</i>	fustis, <i>rod</i>
lacinia, <i>lace</i>	serra, <i>saw</i>
lagena, <i>bottle</i>	pupula, <i>doll</i>
niger, <i>black</i>	situla, <i>bucket</i>
chirotheca, <i>glove</i>	acus, <i>needle</i>
sudarium, <i>handkerchief</i>	vitta, <i>ribbon</i>
rota, <i>wheel</i>	filum, <i>thread</i>
ursus, <i>bear</i>	ruber, <i>red</i>
aedes, <i>house</i>	ferrum, <i>iron</i>
tapes, <i>carpet</i>	arbor, <i>tree</i>
ceruleus, <i>blue</i>	discus, <i>pan</i>

forfex, *scissors*
 compes, *bolt*
 furca, *fork*
 viridis, *green*
 ligo, *spade*
 albus, *white*
 securis, *axe*
 caminus, *chimney*

ascia, *hatchet*
 pulvinar, *cushion*
 pulvis, *powder*
 calceus, *shoe*
 sclopetum, *revolver*
 simius, *monkey*
 clavis, *key*
 rutellum, *shovel*

THIRD WEEK

spongia, *sponge*
 tintinnabulum, *bell*
 anas, *duck*
 catillus, *skillet*
 cadus, *tub*
 currus, *wagon*
 *distortor, *wrench*
 ansa, *handle*
 scala, *ladder*
 culter, *knife*
 flos, *flower*
 piscis, *fish*
 illecebra, *bait*
 flagellum, *whip*
 statera, *scales*
 collare, *tie*
 scutula, *saucer*
 machina, *engine*
 cotis, *hone*
 teges, *mat*
 scrinium, *cabinet*
 cirnea, *churn*
 vexillum, *flag*
 siphon, *faucet*
 *capistrum, *collar*

lamina, *blade*
 *linteolum, *bib*
 ephippium, *saddle*
 mantele, *towel*
 sebaceus, *candle*
 *vehiculum, *barrow*
 larva, *mask*
 aviarium, *cage*
 spinula, *pin*
 *volsella, *plier*
 *cylindrus, *roller*
 umbella, *umbrella*
 horologium, *watch*
 rheda, *carriage*
 manica, *mitten*
 femina, *woman*
 cingulum, *belt*
 caput, *head*
 tuba, *horn*
 petasus, *hat*
 manus, *hand*
 crux, *cross*
 margarita, *pearl*
 caesaries, *hair*
 sulphuratum, *match*

FOURTH WEEK

*sarracum, <i>sledge</i>	*rectrix, <i>plumb</i>
candelabrum, <i>candlestick</i>	acicula, <i>awl</i>
*longavox, <i>telephone</i>	*calmarus, <i>gimlet</i>
*tunditor, <i>maul</i>	*rotor, <i>auger</i>
*clamiculus, <i>mandrel</i>	lima, <i>file</i>
*tenax, <i>vise</i>	cardo, <i>hinge</i>
*aequator, <i>plane</i>	*relleus, <i>reamer</i>
*vello, <i>scraper</i>	*diametrus, <i>calipers</i>
*scalpator, <i>gouge</i>	*prelium, <i>pincers</i>
pero, <i>sole</i>	*arripior, <i>tongs</i>
*mensor, <i>gauge</i>	*quattio, <i>masher</i>
apis, <i>bee</i>	tympanum, <i>drum</i>
*verrator, <i>sweeper</i>	*plumbum, <i>bob</i>
auricula, <i>ear-ring</i>	*vestigium, <i>track</i>
*pegma, <i>pin-cushion</i>	*syngrapha, <i>bank</i>
sutorium, <i>thimble</i>	*cornea, <i>whistle</i>
*oculatum, <i>goggles</i>	*incisor, <i>clipper</i>
*scobs, <i>ash-tray</i>	cochlea, <i>screw</i>
*prehensa, <i>clamp</i>	atramentarium, <i>ink-well</i>
navis, <i>boat</i>	cuneus, <i>wedge</i>
*revertor, <i>reel</i>	*scalprum, <i>chisel</i>
*semia, <i>trowel</i>	laqueus, <i>trap</i>
*depressor, <i>groover</i>	tabula, <i>blackboard</i>
ineus, <i>anvil</i>	corium, <i>strop</i>
calcar, <i>spur</i>	*signum, <i>escutcheon</i>

The re-tests were given five weeks after the last lesson. There were three re-tests; a recognition test, a right-meaning test, and a best-choice test. The object in giving so many tests was to expose as fully as possible the contents of the subjects' minds. Enough of each test is here reproduced to give an idea of its contents.

RECOGNITION TEST.

Name.....

Put a (X) before each word that was among those you studied. Do not put any mark at all before the other words.

fortiter	lente	invicte
civitas	acus	plaudo
mille	pupula	objectus
spondeo	reservo	aliquis
felis	regularis	fictile

There were in this test 400 words that the subjects had not seen, making a total of 600. This was scored according to the formula $\frac{R - W}{2}$.

RIGHT-MEANING TEST.

Name.....

Write down the meanings of these words:

aequator..... cylindrus prelium
ansa..... depressor prehensa

This test was scored according to the formula $\frac{R}{2}$.

BEST-CHOICE TEST.

Underline the one of the English words that gives the correct meaning of the Latin word. Never underline more than one word.

acicula	plane	vase	jack	awl
acus	awl	white	flower	needle
aedes	house	horse	stove	rod
aequator	bridle	plane	stove	rod
albus	mitten	white	red	spade

It will be observed that the meanings suggested are always taken from among the English words that occurred in the lessons.

This test was scored according to the formula $\frac{R}{2}$.

The records of the subjects follow.

TABLE XIV. SCORES OF EIGHT SUBJECTS IN THE FOUR-WEEKS' EXPERIMENT.

OBJECTIVE-METHOD GROUP.

SCORES								
Subj.	I Week	II Week	III Week	IV Week	Recog. Test	Right Mean.	Best Ch.	Aver. 3 End-Tests
J. R.	100	86	90	68	71	31	86	....
H. C.	86	72	68	48	14	10	60	....
R. McC.	100	90	90	58	64.5	35	82.5	....
R. B.	100	98	100	98	61	37	90.5	...
Average	96.5	86.5	87	68	52.6	28.3	79.8	53.6

NON-OBJECTIVE-METHOD GROUP.

SCORES								
Subj.	I Week	II Week	III Week	IV Week	Recog. Test	Right Mean.	Best Ch.	Aver. 3 End-Tests
D. Ar.	100	98	100	90	76	40	69.5	....
E. V.	100	94	98	58	61.5	46	67	....
H. C.	76	100	100	88	65.5	22.5	88.5	....
D. A.	100	100	100	100	80.5	46	94	....
Average	94.0	98.0	99.5	84	70.9	38.6	79.8	63.4

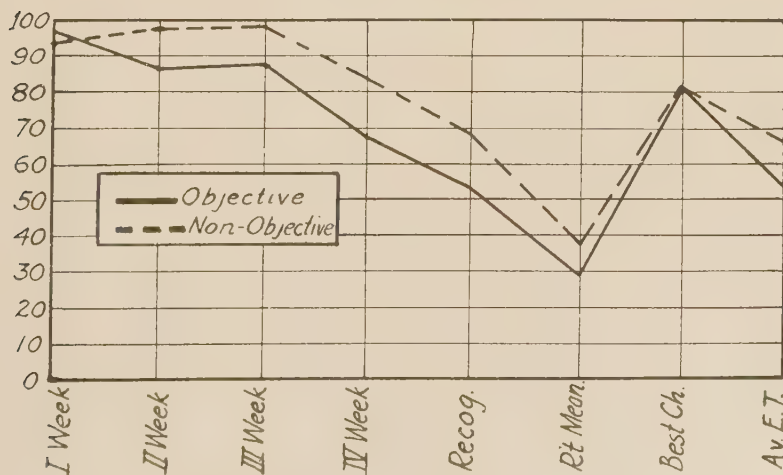


Fig. 10. Showing the Work of Eight Subjects in the Four Weeks' Experiment.

An inspection of the data and the accompanying graph reveals the fact that objective methods were apparently of no advantage to the group that used them. This group began by scoring 96.5 in the first week's work, as opposed to 94 in the case of the non-objective method group. In the second week's work the latter group gained slightly, while the former sank to 86.5 and from that time on remained behind. Using the averages derived from the four weeks' work as denominators and the averages of the three end-tests as numerators, we find that the objective-method group retained 60.3 per cent of the amount learned, while the non-objective method group retained 60.9 per cent.

But the results of the experiment were to a large extent negative, indicating that several weeks' practice in learning by objective methods would not invariably and of necessity cause the objective group to draw away from its competitors. It seemed to the writer that motivation had more to do with the results than methods. The fluctuations in the subjects' scores seemed to indicate that application was not always kept up to the same level. The writer therefore determined to carry the experiment through a second time under improved conditions.

EXPERIMENT TWO.

The changes and improvements made when the experiment was carried through for the second time were as follows:

1. A few poorly-selected words were eliminated, such as *spongia*, a sponge; *lampas*, a lamp. A dozen or so of words representing unfamiliar objects were substituted; and all these difficult words were distributed more evenly throughout the four weeks.

2. Instead of having the subjects study ten words every day, twenty words were assigned for the first day, ten for each of the succeeding three days, and the study-period of the fifth day was given entirely to a repetition of all the words of the week.

3. The number of subjects was increased to thirty-two. On several occasions, when subjects were absent for a day, the work was made up on Saturday. On account of absences for which compensation could not be made in this manner, the number of subjects was ultimately reduced to twenty.

4. The work was done in the parochial schools of Florissant, Missouri, where the writer could at all times maintain personal supervision over the subjects. He met and encouraged them as occasion demanded, and the indications were that all the subjects were at all times doing the best work of which they were capable.

5. An addition was made to the final end-tests. After sustaining the recognition, right-meaning, and best-choice test, the subjects received back their original material and spent half an hour in study. At the expiration of this time the right-meaning tests were returned to them, and they were allowed to make in blank spaces provided for this purpose whatever corrections and alterations they could.

The purpose here was to reveal not only what the children knew and could express, but also, so far as possible, what might lie below the limen of conscious knowledge.

6. In the first experiment we were dealing with uninstructed learning, at least so far as the attempt on the part of the subjects to derive help from objective methods was concerned. In the second experiment an effort was made to instruct the objective-method group in the way that would prove most helpful to them.

The writer was not aware of any passages in educational literature that laid down rules for drawing profit from pictures in the learning of a foreign vocabulary. He was therefore forced to depend upon his own ingenuity and the help he could receive. For this purpose he proposed the problem to a class in educational psychology, numbering about seventy and composed for the most part of teachers in service. Each member of the class wrote out a set of rules to be given to the subjects. With these rules as a help the writer drew up the following set of instructions:

"1. You know that everything has a name. All the things whose pictures you meet on the cards have a name. They have an English name and also a Latin name.

"2. After you have taken up one of the cards, close your eyes for a second and try to see a picture of the thing in your mind. Then try to see close to it, or on it, or under it the Latin name that it has. If it is a bird, for example, try to see a picture of a bird with its name, and say to yourself, 'Avis, a bird.'

“3. Whenever you see one of the things whose names you have learned, at home, or at school, or in the streets, try to have the picture come back, and always see the name together with the picture.

“4. But you must not waste time trying to make these pictures in your mind. You must always work hard and fast. The great thing you have to do is to learn the words.

“5. Perhaps you yourself can think of or find some other way in which the pictures can help you. If you can, use your own way, whatever it is.”

It will be noted that the objective-method group were encouraged to think of the words outside the study-period.

The non-objective-method group were not instructed in any way. Both groups were forbidden to study except at the assigned times, and their material was always taken away from them at the conclusion of the lessons.

In studying the data given, it is important to remember that the one index of the comparative efficiency of the two methods must be sought in the parallelism or non-parallelism of the graphs. For the purpose we have in mind is to determine whether after a longer period of practice the children using objective methods would become better accustomed to them and make comparatively better progress.

The objective-method group gave evidence from the start of being a superior group; the decidedly inferior work of F. McM. and A. W. in the other group contributing largely to this result.

The objective-method group was 12 points superior in the first week's work, scoring 83 to 71. In the second week the non-objective-method group attained its high point of 76, while the objective-method group advanced one point only, to 84. During the last two weeks the scores were 82 as opposed to 65, and 84 as opposed to 65.

The four tests for deferred recall deserve the most serious consideration, confirming as they do the evidence of all the other experiments to the effect that *nouns* learned non-objectively are retained better. The average superiority of the objective-method

TABLE XV. SHOWING SCORES OF 20 SUBJECTS IN THE FOUR-WEEKS' EXPERIMENT.

OBJECTIVE-METHOD GROUP.								
SCORES								
Subj.	I Week	II Week	III Week	IV Week	Recog. Test	Right-Mean. Test	Best Choice Test	Cor. Right-Mean. Test
A. A.	94	100	78	96	79.5	33.0	75.0	55.5
A. D.	100	100	80	88	52.0	78.0	90.5	93.5
I. E.	98	100	92	100	87.0	67.0	94.0	97.0
A. E.	82	100	98	96	87.5	70.5	96.5	87.5
L. L.	100	100	82	100	36.0	49.0	62.5	62.0
C. M.	54	36	78	64	58.0	45.5	81.5	62.5
A. M.	62	88	74	60	49.5	30.5	65.5	53.5
C. R.	98	100	80	98	71.5	63.0	90.5	77.0
J. S.	80	30	70	88	35.0	59.5	68.5	77.5
R. S.	62	86	88	52	68.0	15.5	72.0	27.0
Aver.	83	84	82	84	62.4	51.2	79.7	69.3

NON-OBJECTIVE-METHOD GROUP.								
Subj.	I Week	II Week	III Week	IV Week	Recog. Test	Right-Mean. Test	Best Choice Test	Cor. Right-Mean. Test
F. B.	28	54	38	44	27.5	16.5	39.5	32.0
E. B.	88	98	100	98	85.5	59.5	72.0	94.0
F. H.	88	82	96	68	84.0	70.5	92.0	86.5
C. K.	96	98	84	82	66.0	38.0	83.5	74.5
J. K.	64	90	62	82	63.0	29.0	76.0	49.0
F. McM.	34	16	6	20	3.5	8.5	23.5	10.5
G. M.	100	100	80	44	75.0	86.5	91.0	100
F. N.	100	100	100	100	88.5	87.0	97.5	99.5
A. W.	12	24	8	10	4.0	5.0	19.5	5.5
R. L.	100	100	78	100	61.0	82.0	84.0	95.5
Aver.	71	76	65	65	55.8	48.3	67.9	64.7

group during the four weeks' work was 13.5 per cent; in the end-tests its superiority was respectively 6.6 per cent, 2.9 per cent,

11.8 per cent and 4.6 per cent. Of the four end-tests, the last was undoubtedly of the greatest importance; for here the subjects, after sustaining three tests, were allowed to study their original material for thirty minutes and then make whatever corrections

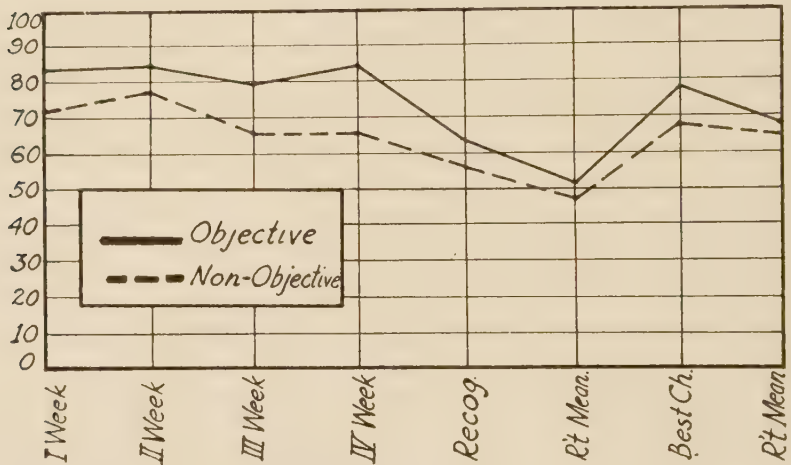


Fig. 11. Showing the Work of Twenty Subjects in the Four Weeks' Experiment.

they could in their right-meaning tests. Here the objective-method group scored 64.7 as opposed to 69.3—an almost complete wiping-out of their initial superiority. Taking the averages of the four weeks' work as a basis of comparison, the objective-method group retained 83 per cent of the material learned, while the other retained 93 per cent.

In this experiment the words used were exclusively nouns and adjectives. We have already seen (page 129) that these parts of speech are not helped by objective presentation. This ancillary experiment, therefore, confirms our previous findings. It is unfortunate that the fact that verbs are learned better objectively was not discovered in time to permit the organization of an experiment containing verbs.

The usual effects of rote-methods are manifested by the falling-off in the scores of the non-objective-method group. The question, then, is really not whether an objective-method group will improve

with practice, but rather how many children can be expected to maintain a constant pace with non-objective methods.

It is interesting to note that both in this experiment and in the preceding one the objective-method group showed most favorably in the best-choice test, indicating that a suggestion or clue would prove of more service to them than to the other group. Should this prove to be a constant phenomenon in work of this type, the underlying law would deserve further study.

CHAPTER VIII.

SUMMARY AND CONCLUSIONS.

THE EXPERIMENTS AND THEIR OUTCOME.

1. A total of 4,844 eighth- and sixth-grade boys and girls in public and parochial schools studied fifty Latin words by objective methods and fifty words by non-objective methods.

2. The objective methods consisted in displaying the objects or performing the actions represented by the words, and in studying from lessons containing illustrations of the objects and actions. The non-objective methods consisted in reading over the vocabularies and in translating sentences of the "Acus est acuta" type containing the words to be learned. The objective and non-objective groups did identically the same work except for the introduction of the objects, actions, and illustrations.

3. The efficiency of the learning-process was measured by administering two tests, one at the conclusion of the lessons and the other after a month, in each of which tests the subjects were required to give the correct English equivalents of the Latin words learned.

4. From a cross-comparison of the work done by different groups of subjects studying under different conditions during the first week, it appears that one block of fifty words is learned better objectively; the other block of fifty words, non-objectively.

From a direct comparison between the first and second week's work of the same subjects, it appears that when non-objective methods were used first, the tests for immediate recall showed little superiority for either method; but the tests for deferred recall showed less perfect retention of the material learned objectively. When objective methods were used first, they showed superiority in both tests, particularly in that for deferred recall.

6. A word-count was made from 13,082 test-papers submitted in the tests for immediate recall. By means of this count the

average score made for each of the hundred words for each of the thirty-two combinations dependent on grade, sex, form used, and order followed, was determined. The count revealed the fact that nouns and adjectives, when presented as they were in the experiment, lose by objective presentation as often as they gain; but that verbs are consistently learned better, and this to a marked degree.

6. The girls made slightly better scores than the boys, especially in the tests for immediate recall.

7. Ranked in the order of their favorable reaction to objective methods, the subjects involved in the experiment are: Eighth-grade girls, sixth-grade girls, sixth-grade boys, eighth-grade boys. The three last-named classes were very closely grouped.

8. Objective methods seemed to benefit inferior pupils in about two-thirds of the cases, but the evidence is not conclusive.

9. In an experiment involving 260 subjects, in which the only modification consisted in the elimination of the large illustrated lessons, the non-objective methods proved superior in both tests.

10. In an experiment for deferred recall after three months instead of after one, involving 135 subjects, it was indicated that the trend of the curve of forgetting, in the case of both methods, would undergo no substantial change after that lapse of time.

11. In two experiments, one with eight subjects and one with twenty, in which nouns were studied from pictures ten minutes a day, five days a week, for four weeks, the evidence pointed to inferiority in the objective methods, whether learning was instructed or uninstructed.

12. It appears not merely probable, but certain, that nouns and adjectives *as a class* are not helped by objective methods. Some are, but others are not. It is certain that the verbs used in the lessons were as a rule helped by objective methods. It is *probable* that all verbs lending themselves equally well to objective presentation would be so helped. But this is true only of learning, not of retention, for the word-count included no tests for deferred recall.

THE PROBLEM OF INTEREST.

The author's statement, made on several occasions before being published here, to the effect that pupils who had been taught by objective methods the first week refused to work up to capacity the second week, has brought down upon his head the wrath of more than one champion of the concrete, visual, and objective.

The author believes that objective presentation is, and has been shown to be, psychologically inferior in the case of nouns and adjectives. Since these parts of speech constituted 60 per cent of the words in the lessons, it could scarcely prove far superior when measured in terms of the total result.

But over 90 per cent of the children, when asked for their preference, voted with enthusiasm for the objective methods. The majority of teachers, too, seemed to favor them and believe in them. And if the results achieved were inferior, they were not seriously so. The children were therefore acting quite rationally when they refused to respond with equal zest to methods which were conventional, dry, and uninteresting, and which did not have power to raise their performance to a much higher level. That this is actually what happened is the testimony of numerous teachers participating in the experiment who taught the picture-lessons first. In the opinion of the author, therefore, the statement as first made and as repeated here should be allowed to stand as true.

The author has no intention of condemning objective methods in general, nor does he even wish to imply that such evil effects as followed their employment in this experiment would necessarily recur in all work of the same kind.

Certainly it is wrong to apply to a method this one test, that it is psychologically sound and that children who submit to it will learn what is required of them. The school should be not an efficient place merely; it should be a happy place. The cudgel, the ferule, the sharp word, the exercise of overbearing authority will, as history shows us, result in getting lessons learned; but there is no need to fill human hearts with fear, sorrow, and disgust, and to run the risk of developing slavish though well-stored intellects when we can put joy in hard tasks and the calm liberty of a reasoning mind even into an act of obedience.

Yet vacation-time will always bring to the child the sense of toil suspended as well as of an interrupted game. Education can not be all play. The child must have "the will to learn" (44:582); he must be content to do without the biologically adequate stimulus (23); he must be willing to accept the sentence of G. Stanley Hall, certainly no foe of youth, who says (30:451):

Just as about the only duty of the young child is explicit obedience, so the chief mental training from about eight to twelve is arbitrary memorization, drill, habituation.

And as a matter of fact the normal child comes to us docile, obedient, willing to labor, eager to learn. With that wisdom of youth which perceives totals without observing the constituent parts, and reaches conclusions without formulating the premises, he explores his teacher in search of those things which he knows he ought to find—goodness, love, strength, patience; and with these moral qualities, the power to give him something of worth that will function in his life.

A teacher who does not crush children with burdens too heavy for them to bear, and who brings them to feel that they are growing in control over some process, will secure all the interest necessary independently of any game.

We have not always been as observant of this principle as we should have been, and it is a great tribute to the nobility of the Latin language and its inherent power as an educational instrument that pupils still elect it as they do.

We have made Latin too philological. When it would be enough to teach a paradigm, we have divided the word into stem and termination and dubbed it a dental, guttural, or lingual.

We have in general mapped out the work in such a way that after some months of work a pupil has very little power to read independently; nor does he as a rule perceive that he has acquired anything specific—such as improvement in English spelling or grammar, a deeper knowledge of English words, ability to understand abbreviations, quotations, etc., which will become for him the reward of so much labor. That improvement—specific improvement—exists the author does not doubt; but teachers have too commonly failed to aim at such specific improvement or even

to be conscious of its possibility. The pupil has acquired it, but he does not *feel* that he has done so.

We have neglected to map out the minimum essentials and to get them learned effectively; and hence pupils only too often realize, when a few months have passed, that in vocabulary, etymology, syntax, and power to read and write alike they have failed to master what they should have mastered. As well ask an army in complete rout to feel exultant as demand that a child in such a state of mind should "like" Latin.

We have selected such an author for second year, and have demanded the reading of so many lines in him, that our intention would appear to be to annihilate on the spot any pupil who dared to ask for a second year of Latin after having had experience of one.

We have, in ultra-scientific fashion, adopted in most of our schools a pronunciation of the language that is time-consuming and difficult of acquirement. The teacher himself struggles with it to the tick of the metronome; how many have attained to the chief thing of value it confers—power to read verse quantitatively—is a matter of conjecture, but that numbers fail is a fact confirmed by daily observation.

Eleven out of twelve children who must remember whether *socius* has or has not a macron will never be benefited by such knowledge; while all twelve must pronounce the *c* in such a way as to hinder them from seeing and feeling the connection of the word with the great family of English words that has sprung from it.

These are shortcomings in the teaching of Latin. But we must not exaggerate their importance. If some things are poorly planned, many others are well done. There is no subject in the course of studies that is perfectly taught. The efficiency and devotion of teachers and the ability of children to carry an extra load have saved the situation. But when we wish to improve conditions, these are the things of which it will be profitable to think.

Should objective methods have place in any plan for the reorganization of the Latin course? This question has a double aspect—the psychological and the emotional.

From the psychological standpoint it can be stated as practically certain that the form of objectivity used in this experiment would not result in an increase of efficiency. But if the method could be modified so as to teach the entire vocabulary in the form of action-games in which the verb would be the core, it is highly probable that far superior results might follow. To do this would be to apply to the *indirect* method the principles which Gouin laid down for the direct method. From this position to that of using the direct method in its entirety would be but a step. But here the author would sound a note of warning. Effective as the direct method might be in theory, it would succeed only in the hands of a superior type of teacher. "Corruptio optimi pessima" is a saying that has application here. The more perfect a method is, the more harm it does if not used aright.

From the emotional standpoint it appears undeniable that objective methods develop an enthusiasm almost startling in its intensity. The author himself did some of the teaching in the experiment, and could not but observe a great and constantly-occurring difference between classes that used objective methods and those that used non-objective. The former did the work with real relish; the latter appeared to do so because it was one of the tasks that came up during the day's routine. In all his experience as a teacher, the author has found nothing as spirited, interesting, enjoyable, and human as the classes he conducted with the objective-method pupils. His surprise was indeed great when he found that these classes often made lower scores. It was some months before he could hit upon any satisfactory explanation of the phenomenon. It seems to him now that the pupils who used non-objective methods were observing the Law of Frequency by repeating symbols and meanings as often as they could in the time allowed them, while the others were spending part of the time in things that did not contribute to the establishment of the nexus between symbol and meaning. Just why this should be the case with nouns and adjectives and not with verbs is a question that might well be made the subject of further study.

But the interest of which we have spoken might wane. The pupils might weary of their game; but so too might the other pupils weary of their rote, conventional methods. In both cases,

so the author thinks, that which prevents weariness is the evidence of concrete and visible results. The sense of growth, the realization of achievement, is a thing without which rote methods become barbarous; and games, a farce.

We may therefore conclude by saying that a teacher who has control of his class and who in general knows how to teach Latin may safely use objective methods. In the hands of a teacher who does not know Latin well, who is a poor disciplinarian, or who lacks power to organize the material of instruction logically and present it clearly, non-objective methods would probably be both safer and more effective.

It must, however, be remembered that the learning of a vocabulary is but one of many things that enter into the study of Latin. Just as the perfect organization of his material is the test of the artist, be he poet, painter, musician, or architect, so the effective combining of matter and method is the test of the successful teacher. It is scarcely necessary to state that radical changes in the present technic of the Latin class should not be made in order to effect some slight improvement in the learning of a vocabulary. The acquisition of a vocabulary is but one, and probably a small, detail in the entire plan.

Finally, we must note that when objective methods did prove superior, the result was due almost entirely to the verbs. And in our experiment the verbs learned *non-objectively* were not met in sentence-form, but as detached couplets. Such detached couplets have been held to be, and probably are, as difficult to learn as nonsense-syllables. If verbs were memorized in logically arranged material (sentences)—the old and tried method of the Jesuits—the difference between objective and non-objective presentation might not prove to be as great as it was in this experiment.

APPENDIX.

TEN LANGUAGE LESSONS. A.

LESSON 1

est, is

flabellum , fan	obturata , corked
apertum , open	clavus , nail
funis , rope	infixus , driven
nodatus , knotted	liber , book
lagena , bottle	compactus , bound

1. **Flabellum est apertum.** 2. **Funis est nodatus.** 5. **Lagena est obturata.** 4. **Clavus est infixus.** 5. **Liber est compactus.**

LESSON 2

impono , I dip *	dimidio , I divide in half
crepito , I shake	adumbro , I stipple
interpunctuo , I dot	delineo , I hatch
quadro , I draw a square	sicco , I blot

LESSON 3

sacculus , bag	aduncus , curved
impletus , full	pupula , doll
pila , ball	vestita , dressed
recens , new	digitabulum , glove
hamus , hook	junctum , buttoned

1. **Sacculus est impletus.** 2. **Pila est recens.** 3. **Hamus est aduncus.** 4. **Pupula est vestita.** 5. **Digitabulum est junctum.**

* Because of the special purpose of this study, a few words have been coined or used in new meanings.

LESSON 4

elevo, I raise
verto, I turn
pando, I spread out
pugnito, I clench
complector, I clasp
plaudo, I clap

operio, I cover
vello, I pull
arripio, I grasp
trudo, I poke
indico, I point
pulto, I rap

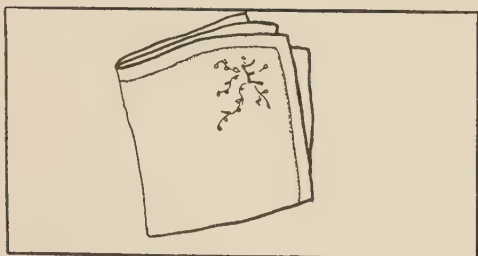
LESSON 5

filum, wire
tectum, insulated
fustis, stick
incisus, notched
graphis, pencil

protracta, long
muscipula, trap
aptata, set
sarcina, package
confecta, wrapped

1. **Filum** est tectum. 2. **Fustis** est incisus. 3. **Graphis** est protracta. 4. **Muscipula** est aptata. 5. **Sarcina** est confecta.

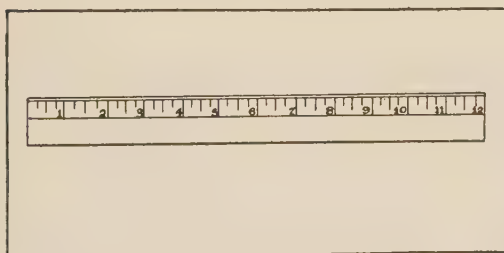
LESSON 6.



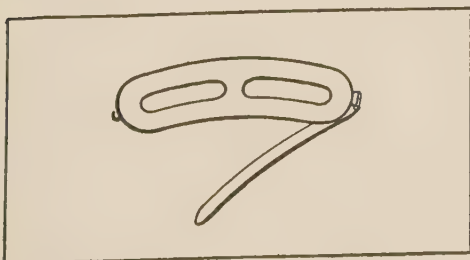
sudarium, handkerchief
depictum, embroidered



turbo, top
fastigatus, pointed

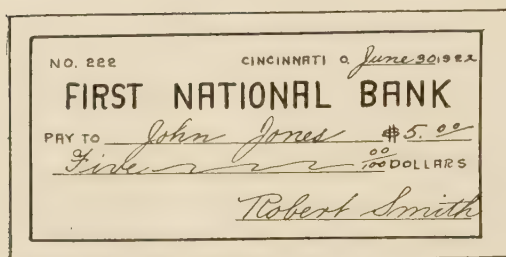


amussis, ruler
recta, straight



fibula, barette
refixa, unfastened

The originals were 9" x 12". The illustrations were the same size as here.



syngrapha, check

subnotata, signed

1. Sudarium est depictum.
2. Turbo est fastigatus.
3. Amussis est recta.
4. Fibula est refixa.
5. Syngrapha est subnotata.

LESSON 7.



devolvere, I unwind



frangere, I break



assumo, I pick up



insero, I thread



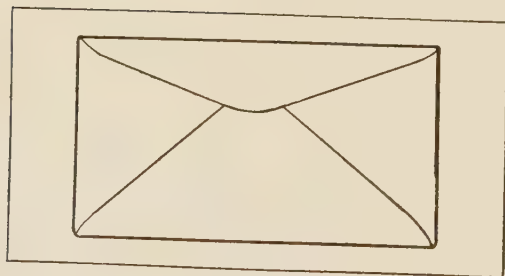
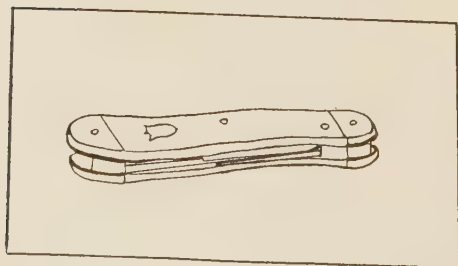
ligo, I tie

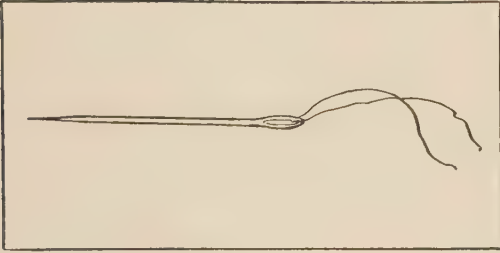


quaero, I look for

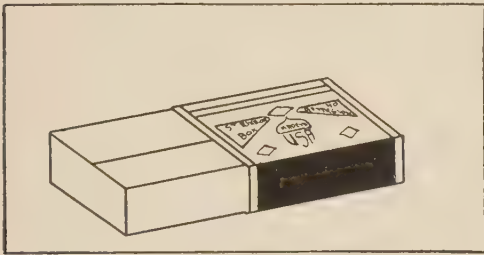
**consuo**, I sew**ostendo**, I show

LESSON 8.

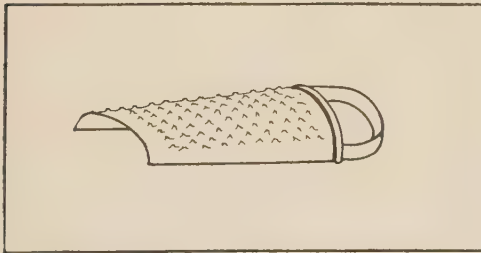
**involucrum**, envelope
agglutinatum, sealed**culter**, knife
clausus, closed



acus, needle
acuta, sharp



capsa, box
vacua, empty



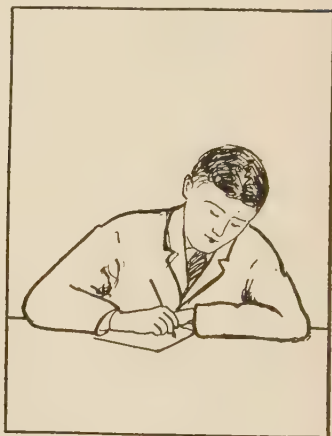
radula, grater
aspera, rough

1. Involucrum est agglutinatum.
2. Culter est clausus.
3. Acus est acuta.
4. Capsa est vacua.
5. Radula est aspera.

LESSON 9.



replico, I unfold



scribo, I write



complico, I fold



terebro, I perforate



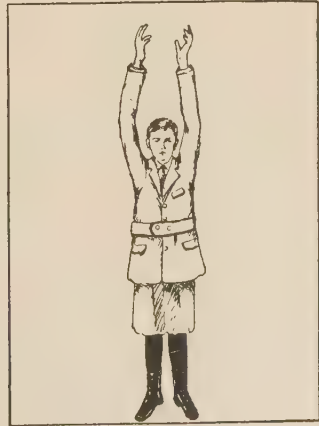
scindo, I tear



rugo, I crumple



sto, I stand up



distendo, I stretch



deflecto, I bend down



percutio, I strike

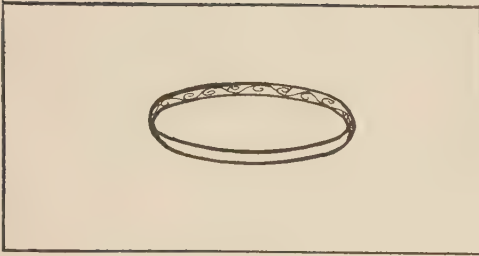


obliquo,
I bend sideways

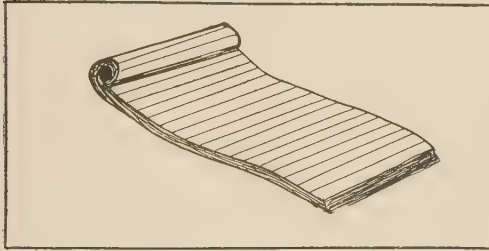


recurvo,
I bend back

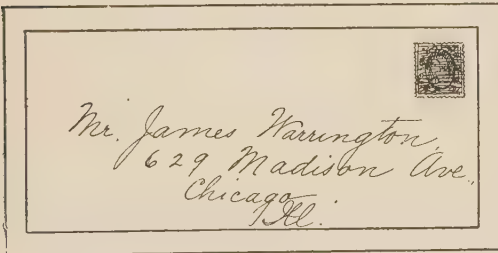
LESSON 10.



armilla, bracelet
rotunda, round



charta, paper
regulata, ruled



epistola, letter
inscripta, addressed



crepundia, marble
levigata, smooth



vexillum, flag
tensum, unfurled

1. Armilla est rotunda.
2. Charta est regulata.
3. Epistola est inscripta.
4. Crepundia est levigata.
5. Vexillum est tensum.

TEN LANGUAGE LESSONS. B.

LESSON 1

est, is

sudarium, handkerchief
depictum, embroidered*
turbo, top
fastigatus, pointed
amussis, ruler

recta, straight
fibula, barette
refixa, unfastened
syngrapha, check
subnotata, signed

1. Sudarium est depictum.
2. Turbo est fastigatus.
3. Amussis est recta.
4. Fibula est refixa.
5. Syngrapha est subnotata.

LESSON 2

devolvo, I unwind
frango, I break
assumo, I pick up
insero, I thread

ligo, I tie
quaero, I look for
consuo, I sew
ostendo, I show

* Because of the special purpose of this study, a few words have been coined or used in new meanings.

LESSON 3

involucrum , envelope	acuta , sharp
agglutinatum , sealed	capsa , box
culter , knife	vacua , empty
clausus , closed	radula , grater
acus , needle	aspera , rough

1. **Involucrum** est agglutinatum. 2. **Culter** est clausus. 3. **Acus** est acuta. 4. **Capsa** est vacua. 5. **Radula** est aspera.

LESSON 4

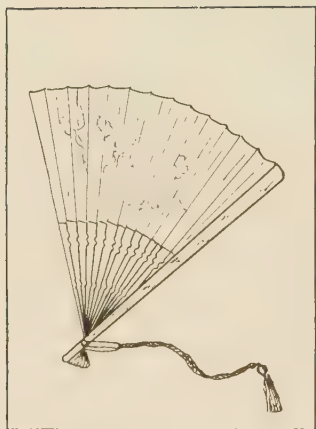
sto , I stand up	replico , I unfold
distendo , I stretch	scribo , I write
deflecto , I bend down	complico , I fold
percutio , I strike	terebro , I perforate
obliquo , I bend sideways	scindo , I tear
recurvo , I bend back	ruo , I crumple

LESSON 5

armilla , bracelet	inscripta , addressed
rotunda , round	crepundia , marble
charta , paper	levigata , smooth
regulata , ruled	vexillum , flag
epistola , letter	tensum , unfurled

1. **Armilla** est rotunda. 2. **Charta** est regulata. 3. **Epistola** est inscripta. 4. **Crepundia** est levigata. 5. **Vexillum** est tensum.

LESSON 6.



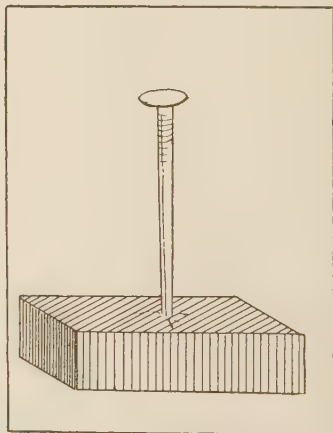
flabellum, fan
apertum, open



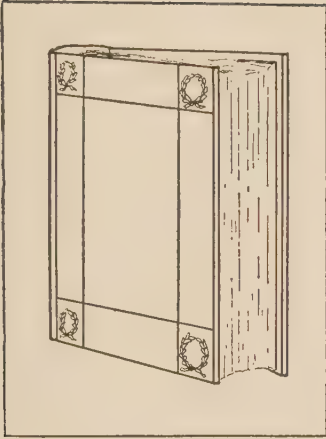
funis, rope
nodatus, knotted



lagena, bottle
obturator, corked



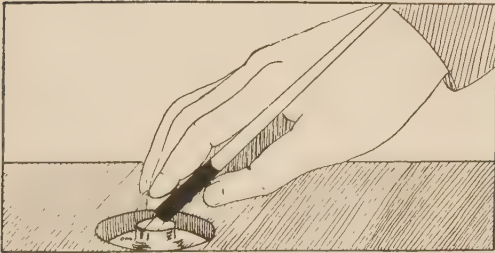
clavus, nail
infixus, driven



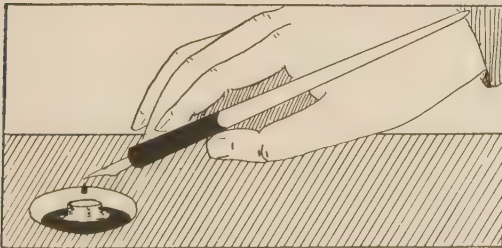
liber, book
compactus, bound

1. Flabellum est apertum.
2. Funis est nodatus.
3. Lagna est obturata.
4. Clavus est infixus.
5. Liber est compactus.

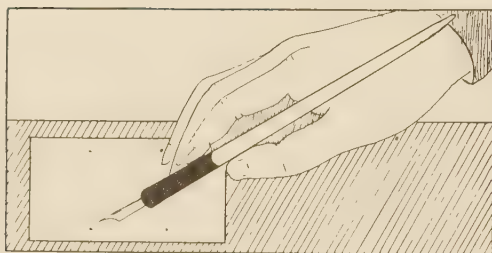
LESSON 7.



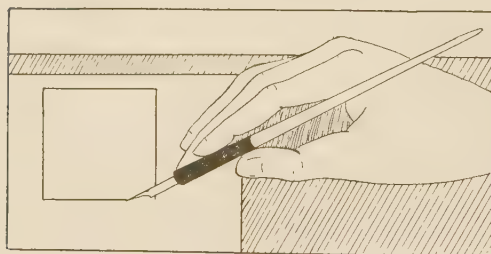
impono, I dip



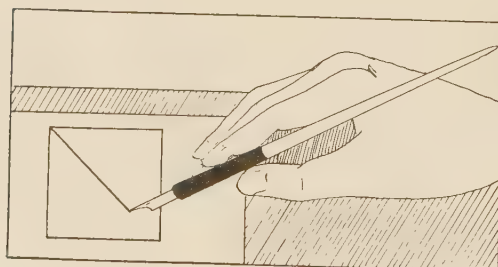
crepito, I shake



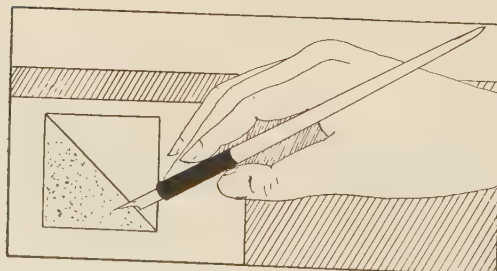
interpunctuo, I dot



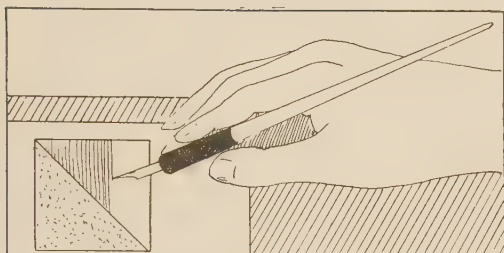
quadro,
I draw a square



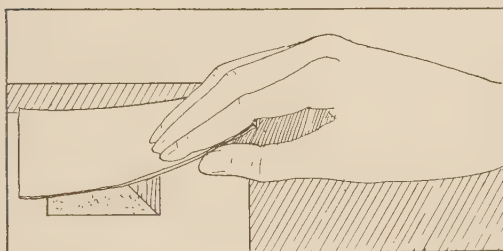
dimidio,
I divide in half



adumbro, I stipple



delineo, I hatch

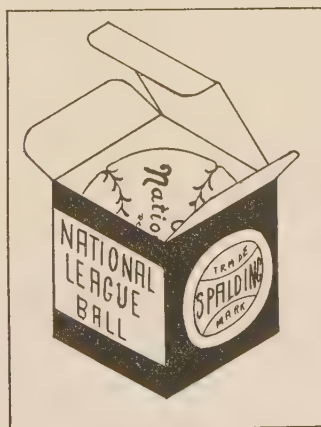


sicco, I blot

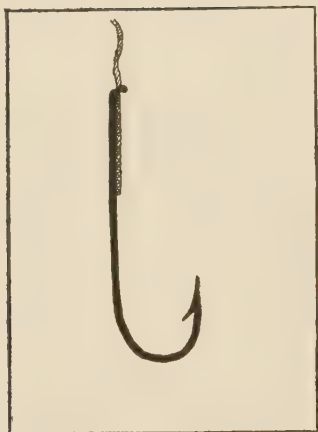
LESSON 8.



sacculus, bag
impletus, full



pila, ball
recens, new



hamus, hook
aduncus, curved



pupula, doll
vestita, dressed



digitabulum, glove
junctum, buttoned

1. Sacculus est impletus.
2. Pila est recens.
3. Hamus est aduncus.
4. Pupula est vestita.
5. Digitabulum est junctum.

LESSON 9.



elevo, I raise



verto, I turn



pando, I spread out



pugnito, I clench



complector, I clasp



plaudo, I clap



operio, I cover



vello, I pull



arripio, I grasp



trudo, I poke

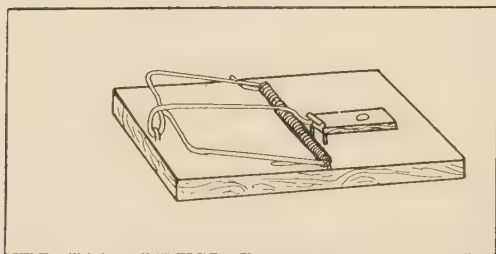


indico, I point



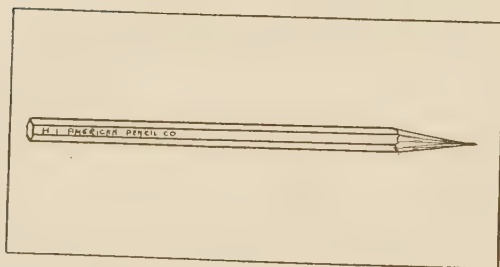
pulto, I rap

LESSON 10.



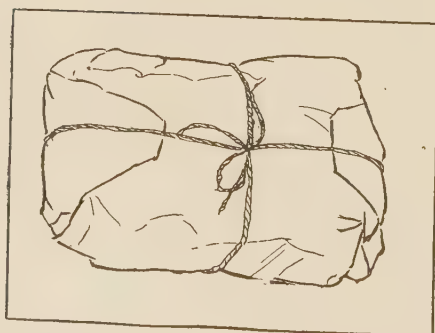
muscipula, trap

aptata, set



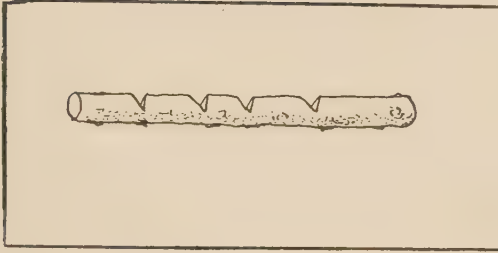
graphis, pencil

protracta, long

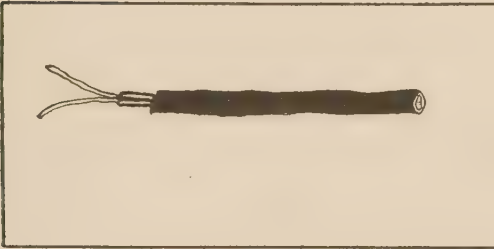


sarcina, package

confecta, wrapped



fustis, stick
incisus, notched



filum, wire
tectum, insulated

- | | |
|---------------------------|--------------------------|
| 1. Muscipula est aptata. | 3. Sarcina est confecta. |
| 2. Graphis est protracta. | 4. Fustis est incisus. |
| 5. Filum est tectum. | |

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